Province of British Columbia
Ministry of Energy, Mines and Petroleum Resources
Hon. Jack Davis, Minister

BRITISH COLUMBIA MINERAL EXPLORATION REVIEW 1990

Information Circular 1991-1

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BRITISH COLUMBIA EXPLORATION AND DEVELOPMENT HIGHLIGHTS FOR 1990: GOLD AND PORPHYRY DEPOSITS CONTINUE TO EXCITE INVESTORS

By V.A. Preto
Manager, District Geology and Coal Resources

INTRODUCTION

The year 1990 was one of new and significant developments in British Columbia. It was also one of transition for junior exploration companies and prospectors, the leading mine finders in the province, as they learned to adjust to life after flow-through.

Unlike 1989, which saw some of the most frantic activity ever, the junior-dominated Vancouver Stock Exchange was adversely affected by the termination of flow-through financing and continued negative publicity, and struggled through a very rough year. Its performance during September was the worst ever recorded.

New discoveries were few as most of the exploration activity was concentrated near exciting "hot spots", such as **Eskay Creek** and **Mount Milligan**, leaving the rest of the province, and particularly the southern half, much quieter.

Exploration expenditures are anticipated to total $143 million, only slightly lower than the $150 million spent in 1989. These expenditures, however, are very unevenly distributed across the province. It is anticipated that some $60 million has been spent in the Stewart - Iskut River area, British Columbia's Golden Triangle, $29 million of this at **Eskay Creek**, which continues to be accessible only by air. Another $25 million or so has been spent in a handful of other major projects in the northwest. Expenditures of $33 million are anticipated for the northern Quesnel trough because of the **Mount Milligan** success, leaving only $25 million, or roughly 16 per cent, for

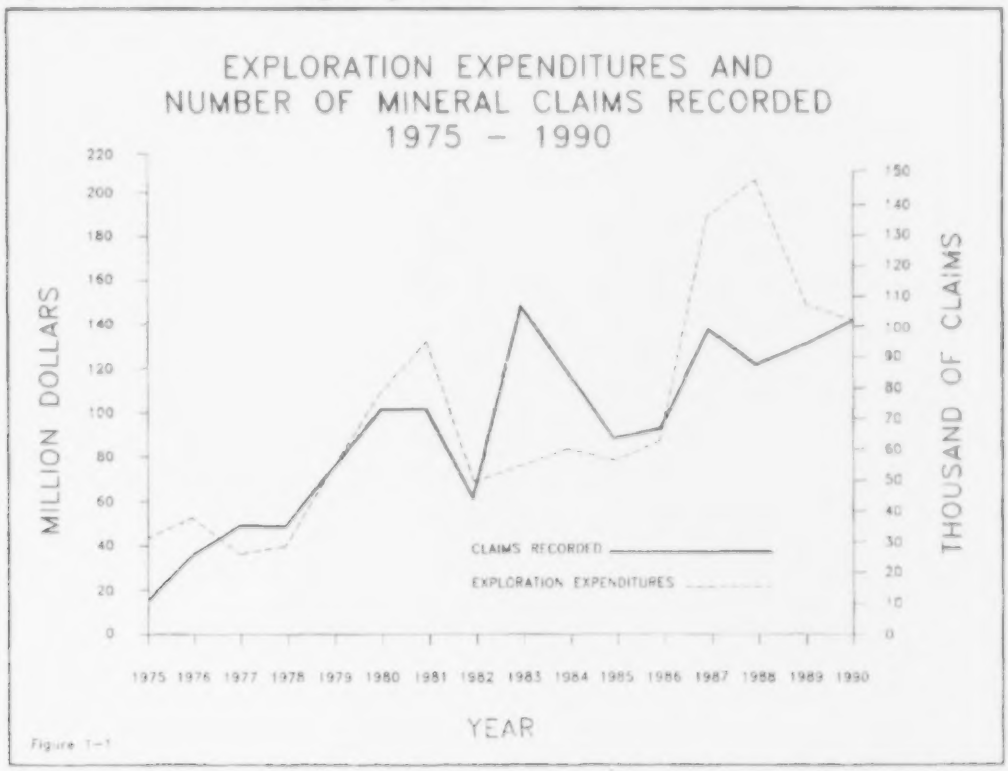


Figure 1-1

Figure 1-2

LOCATION OF PROJECTS

NEW MINES ■
DEVELOPMENT STAGE ●
ADVANCED EXPLORATION STAGE ▲

the remainder of the province. Most of these expenditures have been made by major companies which have either acquired or increased control of some of the key properties such as **Eskay Creek, Snip, Tulsequah Chief**, and **Kerr**.

Mineral claims staking continued on the upward trend that began in 1989 and was up 3 per cent, to 96 117 units, by the end of December 1990. The busiest mining divisions continue to be Liard, Omineca and Skeena, all in the northern part of the province and all good areas for precious and base metals.

ADVANCED PROJECTS

In contrast with the difficulties experienced by the juniors' grass roots programs, several large projects at the advanced exploration or prefeasibility stage, and financed primarily by major companies, reached significant milestones. In the extreme northwest corner of the province a third, and new, copper zone, termed the Ridge zone, was discovered at the **Windy Craggy** copper-gold massive sulphide deposit of Geddes Resources Limited which is at Stage I in the Mine Development Review Process. Early in July, Cominco Ltd. formally announced the decision to proceed with the $65 million **Snip** gold project, held jointly with Prime Resources Group Inc. Production is expected to start in January 1991. Drilling and underground exploration at the rich **Eskay Creek** gold-silver deposit of Prime Resources Group and Corona Corporation continued, with positive results, and was highlighted in August by the spectacular intersection of the 21B zone in the decline. This project entered the Mine Development Review Process in April. An aggressive deep-drilling program by Cominco Ltd. and Redfern Resources Ltd. at the **Tulsequah Chief** volcanogenic massive sulphide deposit was rewarded with a spectacular 50-metre intersection which, together with other "hits", could significantly increase the reserve potential for this deposit. Continued drilling success at the **Sulphurets** gold-silver property of Newhawk Gold Mines Ltd. and Granduc Mines Ltd. brought this project to a feasibility study by Corona Corporation in October.

Control of the giant **Mount Milligan** gold-copper porphyry deposit of Continental Gold Corp. was formally taken over by Placer Dome Inc. in the fall. To November 1st, 1990, 758 holes had been drilled at this project which entered the Mine Development Review Process in February. Drilling continues at a reduced pace, pending a feasibility study and a production decision. A feasibility study of the **Mount Polley** copper-gold porphyry deposit of Imperial Metals Corporation and Corona Corporation concluded that this $131.5-million open-pit project would have a payback period of 3.6 years. The project is at Stage I in the Mine Development Review Process and awaiting financing. The $22-million **Q.R.** gold project of QPX Minerals Inc., received Approval-in-Principle by the Mine Development Review Committee and is also awaiting a production decision.

To facilitate exploration in the rugged Iskut River region, and to provide needed access to the developing **Snip** and **Eskay Creek** properties, the provincial government entered into a joint venture agreement with Cominco Ltd. and Prime Resources Group Inc. to proceed with planning and constructing a road to link the Stewart-Cassiar Highway with the two properties.

MINES

The total value of solid mineral production for 1990 is estimated at $3.265 billion, compared to $3.218 billion in 1989. In the metal sector, gold production is projected to be up approximately 10 per cent to 16.5 million grams (530 500 oz) reflecting new output from **Golden Bear**, and **Premier Gold**, as well as increased output from **Lawyers**, **Samatosum**, **Afton**, and **Equity Silver**. Silver production is anticipated to be up 22 per cent to about 645 million grams (20.7 million oz) reflecting full production from **Samatosum** and increased output from **Equity Silver** and **Highland Valley Copper**. Copper remains the most important metal by far, with an anticipated production of approximately 335 000 tonnes, worth in excess of $1 billion, while coal continues to top the solid mineral production list with an anticipated output valued at $1.2 billion.

Although no new metal mines opened during 1990, the **Golden Bear** gold mine, of Golden Bear Operating Co. and Homestake Mining (B.C.) Ltd, which had opened late in 1989, officially reached commercial production in February, and the **Sullivan** lead-zinc mine of Cominco Ltd., reopened on November 1st after a 9-month shut down. In addition, the underground **McDame** asbestos mine of Cassiar Mining Corporation, opened as planned in November.

Following the trend that began in 1988-89, exploration interest continued to grow for deposits offering more than one recoverable product, such as volcanogenic massive sulphides and copper-gold porphyry deposits, while remaining strong for high-quality precious metal deposits. The targets that received most of the exploration attention are summarized below.

VOLCANOGENIC AND SEDIMENT-HOSTED MASSIVE SULPHIDE DEPOSITS

Volcanogenic massive sulphide targets in Paleozoic and Mesozoic submarine volcanic sequences continued

Figure 1-3

1990
EXPLORATION HIGHLIGHTS

to receive the most attention because of the relatively high unit-value of these deposits and the variety of metals contained, and, most importantly, continuing success at key properties.

Perhaps the most significant exploration news of the year was the spectacular 50-metre intersection grading 2.92 per cent copper, 1.58 per cent lead, 9.09 per cent zinc, 3.83 grams per tonne gold and 170 grams per tonne silver reported by Cominco Ltd. and Redfern Resources Ltd. from Hole 90-22 at their **Tulsequah Chief** property. The focus of the year's program was deep drilling from newly created underground stations to test the possibility of a new ore lens (H) lying above the previously known "A" and "B" lenses. The intersection in Hole 90-22 and others from the same program could significantly increase the geologically indicated reserves of this deposit which in 1989 had been reported by Redfern Resources to be 5.27 million tonnes grading 1.6 per cent copper, 1.31 per cent lead, 7.03 per cent zinc, 2.74 grams per tonne gold and 100.46 grams per tonne silver.

In the extreme northwestern corner of the province, Geddes Resources Ltd. continued with a $15.5 million program on its **Windy Craggy** copper-gold deposit. This property is at Stage I in the Mine Development Review Process and much of the work done consisted of baseline environmental and engineering studies and drilling, as well as fill-in and test drilling in the area of the proposed open pit. During the course of this work a new copper zone, named the Ridge zone, was discovered. Other highlights of the 1990 program are the identification of an oxide capping, enriched in gold and silver overlying the North zone, and confirmation of areas of higher zinc grades in the North zone. Shortly before the discovery of the Ridge zone, current probable and possible reserves had been upgraded to 210 million tonnes grading 1.59 per cent copper, 0.18 gram per tonne gold, 3.62 grams per tonne silver and 0.09 per cent cobalt at a 0.5 per cent copper cut off.

In the north-central part of the province, approximately 80 kilometres southeast of Dease Lake, Homestake Explorations Ltd. and American Reserve Mining Corporation carried out a medium sized drilling program in the area of the **Kutcho Creek** deposit. This volcanogenic massive sulphide deposit, hosted by intensely deformed Upper Triassic felsic pyroclastic rocks, was discovered in the early 1970s. It has pittable reserves of 17 million tonnes grading 1.51 per cent copper, 2.16 per cent zinc and 27.3 grams per tonne silver.

In the busy Golden Triangle, a continuing major exploration effort at the **Eskay Creek** gold-silver deposits of Corona Corporation, Prime Resources Group Inc., Placer Dome Inc. and Adrian Resources Ltd., has shown that the bulk of the mineralization known to date is of a stratabound volcanogenic massive sulphide type (*e.g.* southern 21B deposit) while other deposits have distinct epithermal characteristics (*e.g.* 21A deposit and perhaps the northern 21B deposit). The Eskay Creek deposits were the object of $29 million surface and underground exploration programs, entirely supported by air. Much of the mineraliation is hosted by argillaceous rocks of the lower member of the Middle Jurassic Salmon River Formation, while lesser, but still very important, amounts occur in underlying Lower Jurassic rhyolite of the Mount Dilworth Formatin and dacite of the Betty Creek Formation.

Extensive surface and underground drilling and detailed mapping in the newly created underground workings are gradually improving our knowledge of these deposits. It is evident that the mineralization hosted in the argillite is of a sedimentary exhalative nature as indicated by abundant thin laminations, slumps and other sedimentary features in the sulphide beds. A significant and rich part of the orebody, however, occurs in the footwall rhyolite sequence and is known to have classic epithermal features. Whether the Eskay Creek deposit should be classed as an epithermal or a volcanogenic-sedex system remains open. The sulphides were probably the product of a very shallow hydrothermal system which vented on the seafloor producing both exhalative volcanogenic and epithermal deposits. Some drill holes probing the deeper parts of the system have also indicated stockwork and porphyry-type mineralization, and it may well be that future work will outline significant reserves of this type in the roots of this truly world-class deposit. A recent reserve estimate for the main part of the deposits controlled by the Prime/Corona/Placer Dome interests, including the 21B Zone and parts of the 21C and Pumphouse Lake zones and calculated using a 3.42 grams per tonne gold cutoff yielded a geological reserve of 3.967 million tonnes grading 26.4 grams per tonne gold and 998.4 grams per tonne silver plus significant values in zinc and lead. Additional geological reserves in the order of 4.6 million grams of gold-equivalent have been indicated on the part of the 21B Zone and the TOK claim gap controlled by Adrian Resources Ltd. In addition, there is significant potential to increase reserves in at least seven zones. The Eskay Creek project entered the Mine Development Review Process earlier in the year and a Stage I report is scheduled for the spring of 1991.

American Fibre Corporation and Silver Butte Resources Ltd. continued exploration on the **SIB** deposit, located only 5 kilometres southwest of 21B Zone at Eskay Creek and discovered a new zone of gold, antimony and zinc mineralization hosted by graphitic mudstones interbedded in dacitic pyroclastics. This type of occurence is exciting because of its similarity and proximity to the 21B Zone at Eskay Creek.

Table 1 – 1a
New Mines, Development and Advanced Exploration Projects

Project Status/ Company Name	Project Name	Commodity	Estimated Tonnes (000s)	Estimated Grade %, g/t	Estimated Employment
New Mines					
Cassiar Mining Corporation	McDame	Asbestos	16 000	–	145-170
Development (production decision announced)					
Cominco Ltd., Prime Resources Group Inc.	Snip	Au	936	30 Au	150
Advanced Exploration					
Geddes Resources Ltd	Windy-Craggy	Cu, Au, Ag, Co	210 000	1.59% Cu, 0.18 Au, 3.62 Ag, 0.09% Co	600
Teeshin Resources Ltd.	Dome Mtn.	Au, Ag	295	12.2 Au, 80 Ag	55
Curragh Resources Inc.	Cirque	Pb, Zn, Ag	34 600	2.1%Pb,7.8% Zn, 47 Ag	200
Equinox Res. Ltd.	J & L	Au, Ag, Zn, Pb	808	7.2 Au, 65.7 Ag, 5.2% Zn, 2.5% Pb	80-90
Minnova Inc.	Lara	Au, Ag, Zn, Cu, Pb	529	4.73 Au, 100.1 Ag, 5.8% Zn, 1.01% Cu, 1.22% Pb	?
Corona Corp., Prime Resources	Eskay Creek	Au, Ag	3967	26.4 Au, 998.4 Ag	200 +
Placer Dome Inc.	Mt. Milligan	Cu, Au	400 000	0.2% Cu, 0.48 Au	350 +
Imperial Metals Corp., Corona Corp.	Mt. Polley	Cu, Au	48 000	0.38% Cu, 0.548 Au	250
Q.P.X Minerals Inc.	Q. R.	Au	1200	5.22 Au	75
Newhawk Gold Mines Ltd., Granduc Gold Mines Ltd.	Sulphurets	Au, Ag	500.8	14.33 Au, 617 Ag	50-60
Cominco Ltd., Redfern Resources Ltd.	Tulsequah Chief	Cu, Pb, Zn, Au, Ag	5272 (Redfern Resources)	1.6% Cu, 1.31% Pb, 7.03% Zn, 2.74 Au, 100.45 Ag	?
Regional Resources Ltd.	Midway	Ag, Pb, Zn		7% Pb, 9.6% Zn, 410 Ag	?

In the northeastern part of the province, Curragh Resources Inc. announced a $2 million program of underground exploration and bulk sampling on the **Cirque** sediment-hosted lead-zinc-silver massive sulphide deposit. The deposit is located 280 kilometres north of MacKenzie, the nearest railhead, and has geological reserves of 34.6 million tonnes grading 2.1 per cent lead, 7.8 per cent zinc and 47.0 grams per tonne silver.

In the south-central part of the province, the **J&L** deposit of Equinox Resources Ltd., located a short distance by road north of Revelstoke, was optioned by Cheni Gold Mines Inc. This deposit has drill-indicated reserves of 808 000 tonnes grading 7.2 grams per tonne gold, 65.7 grams per tonne silver, 5.2 per cent zinc, and 2.5 per cent lead.

On Vancouver Island, near Chemainus, Minnova Inc. continued with exploratory drilling on the **Lara** property which has indicated reserves of 529 000 tonnes grading 4.73 grams per tonne gold, 100.1 grams per tonne silver, 5.87 per cent zinc, 1.01 per cent copper and 1.22 per cent

lead. Falconbridge Limited carried out a drilling program on adjacent claims, searching for similar massive sulphide targets. Both properties are underlain by Paleozoic volcanic rocks of the Sicker Group.

EPITHERMAL DEPOSITS

Interest in precious metal bearing epithermal systems in Mesozoic to Tertiary volcanic rocks continued high in several parts of the province. West of Quesnel, near Mount Dent, Eighty-eight Resources Ltd. carried out a surface exploration program on the **Clisbako** gold-silver deposit. Little is known at this time about this new discovery other than it is epithermal in nature and hosted by Eocene Ootsa Lake volcanics.

In the south-central part of the province, 40 kilometres southeast of Merritt, Fairfield Minerals Ltd. and Placer Dome Inc. continued with an aggressive surface drilling and trenching program on the **Elk** property. This is a quartz-sulphide vein system of possible Tertiary age, hosted by the Jurassic Pennask granodiorite. The vein system has been traced on the surface continuously for a distance of 390 metres and intermittently for another 485 metres. It has been tested by 55 drill holes to a depth of 75 metres. Fifteen per cent of the drill holes have returned values greater than 7.9 grams per tonne gold across a true width of 2 metres, while 73 channel samples from a 390-metre continuous trench yielded an average of 17.4 grams per tonne gold across 2 metres true width.

In the southern Okanagan, Inco Gold Co. continued drilling on its **Vault** property, a gold epithermal system hosted in Eocene volcanic rocks.

PORPHYRY DEPOSITS

Driven by the success of the **Mount Milligan** and **Mount Polley** projects, and by reasonably strong copper prices, alkalic copper-gold porphyry systems hosted by Upper Triassic to Lower Jurassic volcanic sequences of the Intermontane Belt continued to be one of the most popular exploration targets in the province. The search for these was responsible for a sharp increase in activity and claim staking in the Quesnel trough, particularly north of Fort St. James, and in the Stikine region near the **Galore Creek** deposit. Gold-rich porphyry systems of the calcalkalic suite were the target of the largest exploration play on Vancouver Island, along what is known as the **North Island Copper Belt** west of the **Island Copper** mine.

In the **Galore Creek** camp Mingold Resources Inc. drilled a number of gold-copper-rich zones that are peripheral to the main alkalic porphyry system. Particular emphasis was put on the **Southwest zone** which also gave the best results and will undoubtedly receive further work. These peripheral zones have yielded intersections grading 3.5 to 10 grams per tonne gold and 1 to 2 per cent copper over 10 to 25 metres. The main Galore Creek deposit, discovered in the 1950s, has drill-indicated reserves of 113 million tonnes grading 1.06 per cent copper, 0.445 gram per tonne gold and 8.57 grams per tonne silver.

A short distance to the east of the Galore Creek deposit, Consolidated Rhodes Resources Ltd. intersected very significant widths of copper-gold porphyry mineralization in drilling the **Copper Canyon** property, an old prospect drilled by Amax Exploration Inc. in the late 1950s and early 1960s.

East of the Unuk River, Placer Dome Inc. carried out a major program, including 17 000 metres of drilling in 74 holes, on the **Kerr** property which was purchased late in 1989 from Western Canadian Mining Corporation and Sulphurets Gold Corporation. Drilling prior to 1990 indicated reserves of 114 million tonnes grading 0.61 per cent copper and 0.27 gram per tonne gold

The Quesnel trough, north of Fort St. James, was one of the most active areas of the province. The impetus was provided by the continued success of the **Mount Milligan** copper-gold project. This large alkalic porphyry system is hosted by Upper Triassic to Lower Jurassic volcanic and high-level intrusive rocks of the Takla Group. The property has been under continuous exploration by Continental Gold Corporation and B.P. Resources Canada Ltd. since 1986 and, as of November 1st, 1990, had been tested by 758 drill holes totalling 168 344 metres. In the fall of 1990 Placer Dome Inc. acquired the property and is now the sole owner and operator. Copper-gold mineralization occurs in a very large sulphide system, 10 square kilometres in area. Drilling to date has indicated a pit-table reserve of 400 million tonnes grading 0.2 per cent copper and 0.480 gram per tonne gold in two deposits, **Mount Milligan** and **Southern Star**, clustered at the eastern end of the sulphide system. The Mount Milligan project entered the Mine Development Review Process in February, and drilling continues at a reduced pace, pending a feasibility study.

Drilling and regional mapping by J.L. Nelson and K. Bellefontaine of the Geological Survey Branch have shown that the Mount Milligan deposit occurs in a subvolcanic setting similar to that of other deposits of this type in southern and northern British Columbia. Furthermore, at least a dozen previously unrecognized small intrusions similar to those that created the Mount Milligan deposit were identified in the two 1:50 000 quadrangles that were mapped.

Work along the Mesozoic volcanic belt from Fort St. James north to the Osilinka River has involved a great many projects, most including drilling. Most notable

Table 1 – 1b
EXPLORATION HIGHLIGHTS

Company Name	Project Name	Commodity	Estimated Tonnes (000s)	Estimated Grade %, g/t	Exploration Expenditures ($ Million)
Homestake Expln. Ltd.	Kutcho Ck.	Cu, Au, Ag	17 000	1.51% Cu, 2.16% Zn 27.3 Ag	1.0
American Fibre Silver Butte Res.	Sib	Au, Zn	–	–	?
Bond Internatinal Gold Inc., Lac Minerals Ltd.	Red Mountain	Au	–	–	?
Eighty-Eight Res. Ltd.	Clisbako	Au	–	–	?
Fairfield Minerals Ltd.,	Elk	Au	–	–	0.75
Placer Ddome Inc.					
Inco Gold Co., Ltd.	Vault	Au	–	–	1.1
Mingold Resources Inc.	Galore Ck.	Cu, Au, Ag	113 000	1.06% Cu, 0.445 Au, 8.57 Ag	?
Consolidated Rhodes Resources Ltd.	Copper Canyon	Cu, Au	–	–	?
Placer Dome Inc.	Kerr	Cu, Au	114 000	0.61% Cu, 0.27 Au	2.8
B.P. Res. Canada Inc., Lysander Gold Corp	Cat	Cu, Au,	–	–	?
Kennco Exploration	Lorraine	Cu, Au	–	–	?
Cathedral Gold Corp.,	Takla-	Cu, Au	–	–	?
Eastfield Resources	Rainbow				
Rio Algom Expln., Ltd.	Klawli	Cu, Au	–	–	?
B.P. Res. Canada ltd.	Chuchi Lake	Cu, Au	–	–	?
Placer Dome Inc.	Windy	Cu, Au	–	–	?
Princeton Mining Corp.	Virginia-Alabama (Copper Mtn.)	Cu, Au	23 000 (approx)	0.3-0.4% Cu, 0.2 Au	2.2
Noranda Inc.	Bell Mine	Cu, Au	–	–	1.0
Moraga Resources Ltd.	Expo-Hushamu	Cu, Au, Mo	79 000	0.3% Cu, 0.34 Au 0.023% Mo	1.0
Placer Dome Inc.	Johnny Mtn.	Au	–	–	2.5
Gulf International Minerals Ltd.	Inel	Au	–	–	2.5
Kokanee Explorations Ltd., Cominco Ltd.	Vine	Pb. Zn, Ag	–	–	1.1
Goldbelt Mines Inc., Gigi Resources Ltd.	Trophy	Au, Ag, Zn, Pb, Cu	–	–	1.0
Avondale Resources Ltd.	Forrest Kerr	Cu, Au	–	–	1.5
Eureka Resources Ltd.	Frasergold	Au	20 000	2.5 Au	1.4
Westmin Mines Ltd.	Debbie	Au	–	–	1.0
Falconbridge Ltd.	Chemainus	Au, Ag, Zn, Pb, Cu	–	–	1.0

amongst these are **Cat** of B.P. Resources Canada Inc. and Lysander Gold Corporation, **Lorraine** of Kennco Exploration, **Takla-Rainbow** of Cathedral Gold Corporation and Eastfield Resources Ltd., **Klawli** of Rio Algom Exploration Inc., **Chuchi Lake** of B.P. Resources Canada Inc. and **Windy** of Placer Dome Inc.

In the southern Quesnel trough, near Likely, the **Mount Polley** project of Imperial Metals Corporation and Corona Corporation received a positive feasibility report. Open-pit reserves at this alkalic porphyry deposit are 48.8 million tonnes grading 0.38 per cent copper and 0.548 gram per tonne gold. This $131.5 million project is at Stage I in the Mine Development Review Process and is awaiting financing. The nearby **Q.R.** deposit of QPX Minerals Inc. has already received Approval-in-Principle by the Mine Development Review Committee. This smaller alkalic porphyry system is also hosted in Upper Triassic to Lower Jurassic Takla Group volcanic and sedimentary rocks and has pittable reserves of 1.2 million tonnes grading 5.22 grams per tonne gold.

In the south-central part of the province, Princeton Mining Corporation undertook an aggressive drilling program to test the **Virginia** and **Alabama** copper zones near its Similco open-pit mining operation at **Copper Mountain**. Its efforts were successful and should significantly extend mine life. New reserve figures are expected shortly. The Copper Mountain copper-gold alkalic porphyry camp produced from 1917 to 1962, and from 1972 to date, including the separate **Ingerbelle** mine. Current reserves are in the order of 180 million tonnes grading 0.4 per cent copper and 0.086 gram per tonne gold. If past production is added to the present reserves, the total inventory for this camp is in the order of 300 million tonnes.

In the Babine Lake area, northeast of Smithers, Noranda Inc. carried out a significant drilling program at its **Bell Mine**. Reports are that the program was successful but the company has not yet stated whether or not reserves have been increased. The Bell deposit is a calcalkalic copper-gold system which since 1972 has produced approximately 65 million tonnes grading 0.48 per cent copper and 0.165 gram per tonne gold.

On Vancouver Island, Moraga Resources Ltd. carried out a large and aggressive drill program on the **Hushamu** zone of its **Expo** property, west of the B.H.P. Utah Mines Ltd. **Island Copper** operation. This calcalkalic porphyry system has been recently reported to contain an initial pit reserve of 79 million tonnes grading 0.3 per cent copper, 0.34 gram per tonne gold and 0.023 per cent molybdenum at a stripping ratio of 0.8:1, with a much larger reserve potential at a stripping ratio of roughly 1.5:1

MESOTHERMAL VEINS AND TRANSITIONAL DEPOSITS

Mesothermal veins and deposits that formed in a transitional setting between the classic epithermal environment and the deeper seated porphyry environment are another important target. Many of these deposits are found in British Columbia's Golden Triangle and include the **Snip** gold deposit of Cominco Ltd. and Prime Resources Group Inc. This $65 million project is under construction and production is expected to begin in January 1991 at 300 tonnes per day. Ore reserves at **Snip**, recalculated using a 12.5-metre drill spacing and a dilution factor of 20 per cent at zero grade, are 936 000 tonnes grading 30 grams per tonne gold. Immediately south of the Snip deposit, Placer Dome Inc., carried out a $2.5 million drilling program on the **Johnny Mountain (Reg)** gold deposit, under option from Skyline Gold Corporation. This mine suspended operations in September, due to exhausted ore reserves, after only two years of operation. A short distance to the southeast, at the head of Bronson Creek, Gulf International Minerals Ltd. carried out an underground drilling program of similar size to test the **Inel** gold deposit.

Located approximately 50 kilometres southeast of Snip is the **Sulphurets** deposit of Newhawk Gold Mines Ltd. and Granduc Gold Mines Ltd. Corona Corporation recently carried out a feasibility study on the **West zone** of this deposit and concluded that, based on a 320 tonne per day operation, the project would require an investment of $42.7 million to bring it on-stream and would incur direct operating costs of $265 per ounce gold equivalent. Fully diluted mineable reserves for the West zone are 500 800 tonnes grading 14.33 grams per tonne gold and 617 grams per tonne silver. The Sulphurets deposit also has several other zones of very significant mineralization which have been explored less than the West zone.

Bond International Gold Inc. and Lac Minerals Ltd. carried out a major program employing three drills on their **Red Mountain** gold property located 15 kilometres east of Stewart. Very little information is available about this property which was discovered in 1989 in an unexpected area. Preliminary indications are that this is a structurally controlled mesothermal vein system in a porphyry environment.

Teeshin Resources Ltd. announced late in the year that it had reached an agreement with Timmins Nickel Inc. to place the **Dome Mountain** gold property in production. Reserves at this deposit are reported at 295 000 tonnes grading 12.2 grams per tonne gold and 80 grams per tonne silver. Mining is planned at about 300 tonnes per day, with projected operating costs of $250 to $260 per ounce of gold.

Near Moyie, southwest of Cranbrook, Kokanee Explorations Ltd. and Cominco Ltd. carried out a substantial drilling program testing the **Vine** Pb-Zn-Ag vein system.

OTHER SIGNIFICANT DEPOSITS

A number of other precious and base metal deposits are definite highlights.

In the Rancheria area, Regional Resources Ltd. undertook a $7.2 million program of mine rehabilitation, underground drifting and drilling on the **Discovery zone** of the **Midway** silver-lead-zinc deposit. This is a manto-type replacement deposit consisting of laterally continuous pipes and pods of mineralization along the contact between a Devonian carbonate unit and overlying shale. Drill-indicated reserves are 1.19 million tonnes grading 7 per cent lead, 9.6 per cent zinc and 410 grams per tonne silver.

In the Stikine - Iskut - Unuk River area significant programs were completed on a variety of gold, silver and base metal deposits, some with skarn affinities, some replacements along faults and shears, and some breccias and replacements along faults, probably related to porphyry systems. These include the **Unuk River** project of Granges Exploration Ltd., the **Jack Wilson Creek** property of Bellex Mining Corporation and Quattro Resources Ltd., the **Trophy** breccia and skarn system of Goldbelt Mines Inc. and Gigi Resources Ltd., the **Forrest Kerr** property of Avondale Resources Ltd. and the **Bronson Creek** property of Cathedral Gold Corporation.

In the Quesnel Lake area, Eureka Resources Inc. carried out a large drilling program on the **Frasergold** deposit, where gold occurs in quartz-carbonate veins and pods in a black phyllite host. Geological reserves are 20 million tonnes grading 2.5 grams per tonne gold.

On Vancouver Island, near Port Alberni, Westmin Mines Ltd. is continuing to test the **Debbie** property with a program of surface and underground drilling and trenching. Gold mineralization occurs in veins and extensive quartz-carbonate-pyrite alteration zones associated with major north-trending faults as well as in a magnetite-jasper sulphide-bearing chert with quartz-vein stockwork in a footwall basalt.

SUMMARY AND A LOOK AT 1991

The year 1990 was one of sustained activity in British Columbia. Significant progress on major projects such as **Eskay Creek**, **Tulsequah Chief**, **Windy Craggy** and **Mount Milligan** reinforced the prospector's natural optimism and confidence that the province's mineral wealth is still largely untapped and holds great promise for the future. The majors, many of them base metal producers, continued to enjoy good profits, and used their cash flow to gain control of the best properties available.

The juniors and prospectors, the province's most successful mine finders, faced the challenge of learning to carry on their business after the end of flow-through financing and in a climate of persistently soft precious metal prices and increasingly stringent environmental controls and regulations.

Most importantly, however, the success of the four major projects mentioned above proved once again that British Columbia's mineral endowment is truly world class and that it can, and will, produce world class deposits. This is the fundamental reason why exploration expenditures decreased only very slightly in 1990 as compared to 1989, while claim staking increased by a very healthy 25 per cent. This performance is in sharp contrast with that of other major mineral-producing provinces and indicates once again that in British Columbia if one looks, one shall find.

TABLE 1 – 2
MINE DEVELOPMENT REVIEW PROCESS (MDRP)
PROJECTS IN REVIEW, DECEMBER 1990

PROSPECTUS

PROJECT/COMPANY DEVELOPMENT REGION	COMMODITY/PRODUCTION RATE*/MINE LIFE	EMPLOYMENT (CONSTRUCTION/ OPERATION)/COMMUNITY	DEVELOPMENT SCHEDULE (STAGE/AIP**/PRODUCTION)
Harmer West Extension/ Westar Coal Kootenay	10 seam coal 4.8 million mtpy	Existing employment Sparwood	Prospectus - Oct 1990 Review by Kootenay Mine Development Review Committee
Silback Premier SB Zone/ Westmin Resources Ltd. North Coast	Au, Ag 100 000 mt total for 1 yr Feed for existing mill	Existing employment Stewart	Prospectus - Dec 1990 Review by Northwest Mine Development Review Committee
Sukunka/Canadian Coal Co. Inc. Northeast	Underground metallurgical coal 2.2 million mtpy for 20 yrs	Constr: 175 Op: 239 Tumbler Ridge, Chetwynd, Dawson Creek	Prospectus - May 1990 Review on-going
Vine Property/Kokanee Explorations Ltd. Kootenay	Bulk sample 200 st Metallurgical testing	Cranbrook	Prospectus - Nov 1990 Review by Kootenay Mine Development Review Committee

STAGE I (OR EQUIVALENT)

PROJECT/COMPANY DEVELOPMENT REGION	COMMODITY/PRODUCTION RATE*/MINE LIFE	EMPLOYMENT (CONSTRUCTION/ OPERATION)/COMMUNITY	DEVELOPMENT SCHEDULE (STAGE/AIP**/PRODUCTION)
Byron Creek South Mine Extension/Byron Creek Collieries Kootenay	Thermal coal	Existing employment	Stage I - Nov 1990 Sparwood
Cirque/Curragh Resources Inc. Northeast	Pb, Zn, Ag 3500 mtpd for 16+ yrs	Constr: 200 Op: 250 Fort St. John, Mackenzie, Prince George	Stage I - Spring 1991
Crystal Peak/Polestar Exploration Inc. Thompson-Okanagan	Garnet 100 – 200 stpd for 20 yrs	Total: To be determined Apex Village, Penticton	Stage I - Winter 1991
Equinox (J & L)/Equinox Resources Ltd., Pan American Minerals Corp.	Au, Ag, Pb, Zn 350 mtpd for 10 yrs	Constr: 50 person yrs Op: 80 – 90 Revelstoke	Stage I - 1991
Eskay Creek/ Corona Corp. North Coast	Au, Ag 750 – 1500 stpd for 10-12 yrs	Constr: 200 – 300 Op: 200 – 250 Smithers, Stewart, Terrace	Prospectus - April 1990 Stage I - March 1991
Golden Crown/ Atwood Gold Corp. Kootenay	Au, Cu 200 stpd for 2 yrs	Op: 20 – 30 Grand Forks	Stage I - 1990
Henretta Dragline/ Fording Coal Ltd. Kootenay	Metallurgical and thermal coal Existing production	Existing employment Elkford	Prospectus - March 1990 Stage I - Dec 1990

Mt. Milligan/ Continental Gold Corp., Placer Dome Inc. Nechako	Cu, Au 60 000 mtpd for 15 yrs	Constr: 500 - 750 Op: 350 Fort St. James, Mackenzie, Prince George	Stage I - Spring 1991
Mount Polley/Imperial Metals Corp., Corona Corp. Cariboo	Cu, Au 13 700 mtpd for 14 yrs	Constr: 153 person yrs Op: 162 Williams Lake	Stage I - Oct 1990 Review on-going
Windy Craggy/ Geddes Resources Ltd. Nechako	Cu, Co, Au, Ag 15 000 - 25 000 mtpd for 30 + yrs	Constr: 500 Op: 618 B.C., Yukon, Alaska	Stage I - Jan 1990 Stage I Addendum - Nov 1990

STAGES II/III

PROJECT/COMPANY DEVELOPMENT REGION	COMMODITY/PRODUCTION RATE*/MINE LIFE	EMPLOYMENT (CONSTRUCTION/ OPERATION)/COMMUNITY	DEVELOPMENT SCHEDULE (STAGE/AIP**/PRODUCTION)
Canty (Nickel Plate Extension)/Corona Corp., Golden North Resource Corp. Thompson - Okanagan	Au 907 mtpd for 15 months	Existing employment Penticton	Waste dump rock drain approved by South Central Mine Development Review Committee - Nov 1990
Silbak Premier Province Zone/ Westmin Resources Ltd. North Coast	Au, Ag 252 000 mt total for 2 yrs Feed for existing mill	Existing employment Stewart	Stage II - Aug 1989 Prod. - 1991 Approved by Northwest Mine Development Review Committee Aug 1990
Telkwa/Crowsnest Resources Ltd. Nechako	Thermal coal 800 000 mtpy for 20 yrs	Constr: 130 Op: 185 Telkwa, Smithers	Stage II - March 1990 Stage II Addendum - Fall 1990

* *Metric tonnes per day (mtpd)*
Metric tonnes per year (mtpy)
Short tons per day (stpd)
** *Approval-In-Principle (AIP)*
SOURCE: Engineering and Inspection Branch

TABLE 1 - 3
ACTIVE EXPLORATION PROPERTIES IN BRITISH COLUMBIA, 1990

Property (Operator)	MINFILE Number	Mining Division	NTS	Commodity	Deposit Type	Work Done
Northwestern Distict						
4J's (Orequest Consultants Ltd.)	104B 128	Skeena	104B/8E	Zn, Pb, Ag, Au		5 ddh, 405 m; geochem; mapping
Albino Lake (Eurus Resource Corp.)		Skeena	104B/9W	Au		initiating 8-10 ddh totalling 2500 m
Atlin Ruffner/Mount Vaughan (Homestake Mineral Dev. Co.)	104N 011	Atlin	104N/11W, 12E	Ag, Pb, Zn	Vein	15 ddh, 1186 m
Axe (Ascot) (Ascot Res. Ltd.)		Liard	104G/9,16	Au, Ag, Cu	Porphyry	1 ddh, 151 m; geochem; geophys
Axe (Beauchamp) (Ascot Res. Ltd.)		Liard	104G/9E	Au, Ag, Cu	Vein	3 ddh, 268 m; geophys; geochem
B1-North (Kestrel Res. Ltd.)		Liard	104B/15	Au		2 ddh, 340 m
Ball Creek (Placer Dome Explr. Inc.)	104G 042	Liard	104G/8W	Ag, Au, Cu	Vein	4 ddh, 330 m
Bar (Goldbank Ventures Inc.)		Atlin	114P/15W	Au, Cu, Pb, Zn	VMS	12 ddh, 1134 m; geophys; trenching; geochem
Bell Mine (Noranda Minerals Inc.)	093M 001	Omineca	093M/1E	Cu, Au, Ag	Porphyry	62 ddh, 20 919 m
Bob Creek (Equity Silver Mines Ltd.)	093L 005	Omineca	093L/7E	Au, Ag, Zn	Transitional	5 ddh, 988 m
Cam 5,6 (Crimsonstar Res. Ltd.)	104B 328	Liard	104B/10W	Au, Ag		4 ddh
Cheni Gold Mine/Lawyers (Cheni Gold Mines Inc.)	094E 066	Omineca	094E/6E	Au, Ag	Epithermal vein	74 ddh, sfc, u/g, 14 846 m; geophys; geochem; 2440 m drifting
Copper Canyon (Cons. Rhodes Res. Ltd.)	104G 017	Liard	104G/3W	Cu, Ag, Au	Porphyry	13 ddh
Coulter Creek (Swift Minerals Ltd.)		Skeena	104B/9,10	Au, Ag		5 ddh, 762 m
Dauntless (Westmin Res. Ltd.)		Skeena	104B/1E	Ag, Au	Vein	1 ddh, 412 m
Deer Horn Mine/Lindquist (Teck Explr. Ltd.)	093E 019	Omineca	093E/6W	Au, Ag, Cu, W	Vein	29 ddh, 2268 m
Del Norte (Orequest Consultants Ltd.)		Skeena	104A/4E,3W	Au, Ag, Cu, Pb, Zn	Vein	12 ddh, 3669 m; trenching; geochem; geophys; mapping
Dome Mountain (Teeshin Res. Ltd.)	093L 022	Omineca	093L/10E, 15E	Au, Ag, Pb, Zn	Vein	18 ddh, 2326 m
Equity Silver Mine (Equity Silver Mines Ltd.)	093L 001	Omineca	093L/1W	Ag, Au, Cu	Transitional	3 ddh, 1088 m
Eric (Equity Silver Mines Ltd.)		Omineca	093L/2E	Cu, Ag, Au	Stratabound	7 ddh, 1077 m; geophys; geochem
Erickson (Erickson Gold Mining Corp.)	104P 029	Liard	104P/4E,5E	Au	Mesothermal vein	43 ddh, 7941 m; geophys
Eskay Creek/Tok-Kay (Corona Corp./Prime Explr. Ltd.)	104B 008	Skeena	104B/9W	Au, Ag	VMS	485 ddh, 96 000 m; 1000 m drifting; bulk sample; geophys; mapping
Foremore (Cominco Ltd.)		Liard	104G/2W	Au, Pb, Zn	Massive sulphide?	5 ddh, 1349 m; geophys; mapping
Forrest Kerr (Pamicon Dev. Ltd.)		Liard	104B/15E	Au, Ag, Cu		24 ddh, 2500 m
Gab 9 (Pamicon Dev. Ltd.)		Liard	104B/10W	Au		5 ddh, 2523 m
Gab-Mon/Seagold (Kestrel Res. Ltd.)	104B 335	Liard	104B/15	Au, Ag, Zn	Vein	7 ddh, 640 m; air and grd geophys; geochem; mapping; trenching
Galore Creek/Stikine Copper (Mingold Res. Inc.)	104G 090	Liard	104G/3W,4E	Cu, Au, Ag	Porphyry	18 ddh, 1925 m
Georgia River (Bond Gold Canada Inc.)	103O 013	Skeena	103O/16W	Au, Ag, Pb, Zn, Cu	Vein	drilling
GJ (Ascot Res. Ltd.)		Liard	104G/9E	Cu, Au	Porphyry	9 ddh, 1656 m; geochem; geophys
GNC (Prime Equities Inc.)		Skeena	104B/9W	Au, Ag, Pb, Zn		19 ddh, 3028 m; geophys; geochem; mapping

Property (Operator)	MINFILE Number	Mining Division	NTS	Commodity	Deposit Type	Work Done
Goat (Integrated Res. Ltd.)		Liard	104G/13W	Au, Cu	Porphyry	1 ddh, 130 m; geochem; mapping; geophys
Golden Bear Mine (Golden Bear Oper. Co. Ltd.)	104K 079	Atlin	104K/1	Au	Vein	10 stc, 9 u/g ddh, 2195 m; 40 m crosscut; geophys; geochem
Gossan/Khyber Pass (Western Canadian Mining Corp.)	104B 138	Liard	104B/10	Au, Ag, Cu, Zn	Vein	9 ddh, 1094 m; geophys; geochem
GOZ-RDN (Noranda Expln. Co. Ltd.)		Liard	104G/2E, 104B/15	Au, Ag, Cu, Pb		15 ddh, 1546 m; geochem grd& airborne geophys
Granisle (Noranda Minerals Inc.)	093L 146	Omineca	093L/16E	Cu, Au, Ag	Porphyry	38 ddh, 9629 m
Grouse Mountain/Copper Hill (Swift Minerals Ltd.)	093L 026	Omineca	093L/10E	Ag, Au	Vein	7 ddh, 1800 m; geochem; mapping
Hank (Carmac Res. Ltd.)	104G 107	Liard	104G/1,2	Au	Vein	5 ddh, 1464 m
Hearne Hill (Noranda Expln. Co. Ltd.)		Omineca	093M/1W	Cu	Porphyry	5 ddh, 856 m
High Ore (Westmin Res. Ltd.)	104B 056	Skeena	104B/1E	Au, Ag	Vein	5 ddh, 845 m; geochem; mapping
Ice (Nararre Res. Gp.)		Skeena	104B/8	Au, Ag, Zn		1 ddh, 98 m
Independence (Armeno Res. Inc.)	104A 038	Skeena	104A/4W	Au, Ag, Cu	Vein	6 ddh, 764 m
Indian (Westmin Mines Ltd.)	104B 031	Skeena	104A/4W	Ag, Au, Pb, Zn	Vein	5 ddh, 928 m; geochem; mapping
Inel (Gulf Int'l Min. Ltd.)	104B 113	Liard	104B/10W	Au, Ag, Cu, Pb, Zn	Vein	23 ddh, 2400 m; 375 m drifting
Iskut Joint Venture (Prime Expln. Ltd.)	104B 356	Liard	104B/11	Au	Vein	14 ddh, 1965 m; geochem
Jack Wilson Creek (Bellex Mining Corp.)		Liard	104G/4E	Cu, Au	Porphyry	5 ddh, 1392 m; geochem; geophys
Johnny Mountain (Skyline Gold Corp.)	104B 107	Liard	104B/11E	Au, Ag, Cu	Mesothermal vein	23 ddh, 4500 m; geophys; geochem; trenching; mapping
Kemess North (El Condor Res. Ltd.)	094E 021	Omineca	093E/2	Cu, Au	Porphyry	12 ddh, 2207 m
Kemess South/Ron-Du (El Condor Res. Ltd.)	094E 025	Omineca	094E/2, 094D/15	Cu, Au	Porphyry	17 ddh, 2686 m
Kerr (Placer Dome Expln. Inc.)	104B 191	Skeena	104B/8	Cu, Au	Porphyry	74 ddh, 17 000 m
Kits-Jade (Oliver Gold Corp.)	103P 233	Skeena	103P/11	Zn, Pb, Ag	Massive Sulphide	mapping; geophys; geochem;
KRL (Kestrel Res. Ltd.)		Liard	104B/10	Au	Vein	13 ddh, 1419 m
Kutcho (Homestake Mineral Dev. Co.)	104I 060	Liard	104I/1W	Cu, Pb, Zn, Au, Ag	VMS	28 ddh, 7050 m; geophys; geochem
Lakewater (Prime Expln. Ltd.)		Skeena	104B/9W	Au, Ag	Massive sulphide	9 ddh, 1650 m; geophys; geochem; mapping
Laredo Limestone/Aristazabal (Laredo Limestone Ltd.)	103A 001	Skeena	103A/11E	Ls	Sedimentary	2 ddh
Lefty (Equity Silver Mines Ltd.)		Omineca	093L/5E,6W	Cu, Ag, Au		7 ddh, 1100 m; geophys; geochem; mapping
McConnell Creek (Placer Dome Expln. Inc.)	094D 006	Omineca	094D/16W	Au, Cu	Vein	10 ddh, 1050 m; geochem; trenching
McLymont (Gulf Int'l Min. Ltd.)	104B 281	Liard	104B/15W	Au, Cu, Ag	Skarn	33 ddh, 4033 m; geophys; geochem; trenching; mapping
Midway (Strathcona Mineral Serv. Ltd.)	104O 038	Liard	104O/16W	Ag, Pb, Zn, Au, Sn, Cu	Manto	68 ddh, 9620 m; 765 m decline & drifting
Moonlight (High Frontier Res. Ltd.)	104A 005	Skeena	104A/5W	Au, Ag, Cu, Pb, Zn	Vein	8 ddh, 1059 m
New (Pamicon Dev. Ltd.)		Liard	104B/15	Au, Ag	Vein	10 ddh, 445 m
New Moon (Maple Resource Corp.)	093E 011	Omineca	093E/13	Au, Ag, Zn	Vein	7 ddh, 725 m; geochem; geophys
Newice (Pamicon Dev. Ltd.)		Liard	104B/14E, 15W	Au	Vein	4 ddh, 292 m
Nica (Ambergate Expln. Inc.)		Skeena	104B/8W	Au		3 ddh, 300 m; mapping
Nickel Mountain (Silver Standard Res. Inc.)	104B 006	Liard	104B/10E	Ni, Cu, Pt, Ag, Tl, Au		1 ddh, 134 m
North Star (Dolly Varden Minerals Inc.)	103P 189	Skeena	103P/11,12	Ag, Au, Pb, Zn, Cu	Massive sulphide	18 ddh, 7096 m
Packsack/Ecstall (Cominco Ltd.)	103H 013	Skeena	103H/14W, 13E	Cu, Zn, Ag, Au, Pb	VMS	3 ddh, 915 m; mapping

Property (Operator)	MINFILE Number	Mining Division	NTS	Commodity	Deposit Type	Work Done
Parrott Lakes, Fix, Lorne (Territorial Drilling Ltd.)		Omineca	093L/7E	Ag, Zn		30 pdh, 2280 m; geochem
Pavey (Lodestar Explr. Inc.)	104M 003	Atlin	104M/15W	Au, Ag, Cu	Vein	11 ddh; geophys; geochem; trenching; mapping
Paydirt (Pacific Century Explr. Ltd.)	104G 023	Liard	104G/4E	Au, Cu	Vein, porphyry	Mapping, linecutting, geochem, geophys
Pinelode (Noranda Explr. Co. Ltd.)		Atlin	104N/11W	Au	Mesothermal vein	3 rcdh, 160 m; geophys
Poker (Dryden Resource Corp.)	104G 001	Liard	104G/13W	Au, Cu	Porphyry	3 ddh, 379 m; geophys; mapping
Polaris-Taku (Orequest Consultants Ltd.)	104K 003	Atlin	104K/12E	Au, Ag, Cu, Sb	Vein	10 ddh, 2862 m; geochem; geophys; mapping
Premier Gold Mine (4G Zone) (Westmin Res. Ltd.)	104B 054	Skeena	104B/1E	Au, Ag, Pb, Zn	Epithermal vein	53 ddh, 3622 m; u/g rehabilitation
Quash Creek (Triumph Res. Ltd.)	104G 033	Liard	104G/16	Cu, Au	Porphyry	2 ddh, 377 m
Ram-Tut-Tot (Trans Atlantic Res. Inc.)	104K 097	Atlin	104K/8W	Au, Ag	Vein	4 ddh, 437 m; geophys; geochem; mapping
Red Mountain (Bond Gold Canada Inc.)	103P 086	Skeena	104P/13	Au, Ag	Massive sulphide?	drilling
Rhub-Barb (Alta Ventures Inc.)		Omineca	093F/11W, 12E	Au, Ag	Epithermal	6 ddh, 610 m; trenching
Rock and Roll (Thios Res. Ltd.)		Liard	104B/11E	Au, Ag, Pb, Zn, Cu	Vein?	9 ddh, 675 m
Rok/Rose (Cons. Canna Res. Corp.)	104H 001	Liard	104H/13W	Cu, Au	Porphyry?	3 ddh, 374 m; geophys; geochem
Shasta (Homestake Mineral Dev. Co.)	094E 050	Omineca	094E/2, 7W,3,6E	Au, Ag	Epithermal vein	27 ddh, 4777 m; geophys; geochem; u/g mapping & sampling
Sib (American Fibre Corp.)		Skeena	104B/9W, 10E	Au, Ag, Pb, Zn, Cu	Massive sulphide?	26 ddh, 1208 m; geophys
Silver Butte (Westmin Res. Ltd./Tenajon Res. Ltd.)	104B 150	Skeena	104B/1E	Ag, Au	Epithermal vein	56 ddh, 7404 m; 13 u/g, 16 Slc ddh, 3672 m
Silver Crown/Strike (Nararre Resource Corp.)	104A 061	Skeena	104A/4W	Au, Ag, Pb, Zn	Vein	930 m, ddh; geophys
Ski (Prime Explr. Ltd.)		Skeena	104B/9W	Au, Ag	VMS	35 ddh, 24 385 m; geophys
Snip (Cominco Ltd.)	104B 250	Liard	104B/11	Au, Ag	Mesothermal vein	2285 m development drifting
Spectrum/Red Dog (Columbia Gold Mines Ltd.)	104G 036	Liard	104G/9	Au, Ag, Cu, Pb, Zn	Vein, porphyry	20 ddh, 2412 m; geochem; trenching
Sphaler Creek/Pass Lake (Cons. Goldwest Res. Ltd.)		Liard	104B/13E, 14	Au, Ag, Cu, Zn		6 ddh, 1110 m; geophys; geochem; mapping
Stu (Kestrel Res. Ltd.)	104B 313	Liard	104B/10	Au, Ag, Cu	Skarn, vein	3 ddh, 457 m
Sul 1 & 2, Unuk 20 (Kennich Mining Corp.)		Skeena	104B/8W	Au, Ag		5 ddh, 300 m; mapping
Sulphurets (Newhawk Gold Mines Ltd.)	104B 193	Skeena	104B/8E	Ag, Au	Epithermal vein	45 u/g ddh, 5800 m
Summit Lake Mine/Scottie Gold (Royal Scot Res. Ltd.)	104B 034	Skeena	104B/1E	Au, Ag, Cu, Pb, Zn	Mesothermal vein	3 slc ddh, 172 m; 4 u/g ddh 546 m; geophys
Tide Lake (Somerville Geological Ltd.)	104B 251	Skeena	104B/8E	Au, Ag	Vein	ddh, geophys; geochem
Todd Creek/Fall Creek (Noranda Explr. Co. Ltd.)		Skeena	104A/5W	Cu, Au		10 ddh, 1249 m; aerial mag; geochem; mapping
TP/Teepee (Cyprus Gold Ltd.)	104M 048	Atlin	104M/10,15	Au, Ag, Zn, Pb	Vein	11 ddh, 1338 m
Trophy Gold (Gigi Res. Ltd.)	104G 053	Liard	104G/3	Au, Cu	Vein	10 ddh, 1885 m; geochem; geophys; trenching; mapping
Tulsequah (Cominco Ltd.)	104K 002	Atlin	104K/12,11	Ag, Au, Pb, Zn, Cu	VMS	8 u/g ddh, 6706 m; u/g mapping; 183 m drifting
Unuk River (Granges Inc.)	104B 083	Skeena	104B/8,9,10	Au, Ag, Pb, Zn		16 ddh, 3000 m; mapping
Waratah (Big M Res. Ltd.)	104B204	Liard	104B/10W	Au, Ag, Cu	Mesothermal vein	4 ddh
Windy Craggy (Geddes Res. Ltd.)	114P 002	Atlin	114P/12E,W	Cu, Co, Au, Ag, Zn	VMS	16 869 m, slc & u/g ddh; geotech; geophys; bulk sampling

Central District

Ahdatay Lake (BP Res. Canada Ltd.)	93N 085	Omineca	93N/7W	Au, Cu	Alkali porphyry	6 ddh, 1068 m; geol; geophys

Property (Operator)	MINFILE Number	Mining Division	NTS	Commodity	Deposit Type	Work Done
Bio (Rio Algom Explr. Inc.)	93K 004	Omineca	93K/16	Au, Cu	Porphyry	geol; geochem
Cantin Creek (Placer Dome Explr. Inc.)	93B 027	Cariboo	93B/16	Au, Cu	Alkali porphyry	12 ddh, 1759 m; geophys
Cat (BP Res. Canada Ltd.)	94C 069	Omineca	94C/3W	Au, Cu	Alkali porphyry	14 ddh, 2590 m; geochem; geophys; trenches; road
Chuchi East (BP Res. Canada Ltd.)	93N 123	Omineca	93N/1W	Au, Cu	Alkali porphyry	geol; geochem; geophys; air geophys, 250 km
Chuchi Lake (BP Res. Canada Ltd.)	93N 159	Omineca	93N/7E,2E	Au, Cu	Alkali porphyry	29 ddh, 5240; geol; geochem; geophys; air geophys, 210 km; road, 5 km
Cirque (Canadian Mine Dev.)	94F 008	Omineca	94F/6	Pb, Zn, Ag	Sedex	u/g develop; 15 ddh; bulk sample; feasibility; road
Clisbako (Eighty-Eight Res.)		Cariboo	93C/9	Au, Ag	Epithermal	geochem; 15 trenches; road, 2.5 km
Dominion Creek (Allan Raven)	93H 133	Cariboo	93H/6	Au, Ag, Pb, Zn	Replacement	pilot mill test
Doreen (Gibraltar Mines Ltd.)	93A 117	Cariboo	93A/7W	Au, Cu	Alkali porphyry	5 ddh, 1067 m; geophys; road, 2 km
Dorothy (Kennco Explr. (West) Ltd.)	93N 007	Omineca	93N/14W	Au, Cu	Alkali porphyry	geochem; geophys; road
Eagle (Noranda Explr. Co. Ltd.)	93N 092	Omineca	93N/2W	Au, Cu	Alkali porphyry	geol; geochem; geophys; road
Fog (Teck Corp.)		Cariboo	93A/15W	Pb, Zn, Ag	Replacement	ddh; geol; geochem; geophys; trenches; road
Frasergold (Eureka Res. Inc.)	93A 150	Cariboo	93A/7E	Au	Phyllite-hosted	25 ddh, 4687 m; 39 pdh, 4262 m; bulk sample
Gaspard Lake (Goldsmith Minerals Ltd.)		Clinton	92O/7,10	Au, Ag	Epithermal	6 ddh, 620 m; geophys
Hanson Lake (Cazador Explr. Ltd.)	93K 078	Omineca	93K/6	Au, Cu	Porphyry related	5 ddh; geol; geochem; geophys
Hawk (Cyprus Gold (Canada) Ltd.)		Omineca	94C/4	Au, Cu	Porphyry	8 ddh, 900 m; geol; geochem; geophys
Heath (Teck Explr. Ltd.)	93N 071	Omineca	93N/6E	Au, Cu	Alkali porphyry	2 ddh, 61 m; 18 trenches, 1700 m; geol; geochem; geophys
Heidi Lake (BP Res. Canada Ltd.)	93N 194	Omineca	93N/1E	Au, Cu	Alkali porphyry	10 ddh, 1427 m; geochem; geophys
J1 (Noble Metal Group Inc.)		Cariboo	93A/13,14	Au, Ag	Vein	4 ddh, 551 m; geophys; trenches; road
Klawli (Rio Algom Explr. Inc.)		Omineca	93N/7E,8W	Au, Cu	Alkali porphyry	5 ddh, 691 m; 5 trenches, 241 m; geochem; geophys, air geophys; road
Lorraine (Kennco Explr. (West) Ltd.)	93N 002	Omineca	93N/14W	Au, Cu	Alkali porphyry	geochem; geophys; road
Mitzi (Noranda Explr. Co. Ltd.)	93N 096	Omineca	93N/1W	Au, Cu	Alkali porphyry	10 ddh, 1050 m; geol; geochem; geophys; air geophys; road
Mt. Alcock (Triumph Res. Ltd.)	94F 015	Cariboo	94F/11W	Pb, Zn, Ag	Sedex	6 ddh, 1212 m; geol; geochem
Mt. Milligan (Placer Dome Inc.)	93N 194	Omineca	93N/1	Au, Cu	Alkali porphyry	387 ddh, 86 604 m; geotech; bulk sample; feasibility, MDRP prospectus
Mt. Sidney Williams (Viceroy Resource Corp.)	93K 039	Omineca	93K/14W	Cr, Au	Listwanite	7 ddh, 305 m; geol; geochem
Nina (Equinox Res. Ltd.)	93N 191	Omineca	93N/15	Au, Cu	Vein	14 ddh, 700 m
Pilot (Cominco Ltd.)		Cariboo	93J/12	Au	Alkali porphyry	ddh, 1000 m; geol; geochem; geophys
Porphyry Creek (Teck Explr. Ltd.)	94C 065	Omineca	94C/5,D/8	Au, Cu	Alkali porphyry	geol; geochem
Punt (Northair Mines Ltd.)	93C 011	Cariboo	93C/8E	Au, Ag	Epithermal	5 ddh, 368 m
Quintette (Quintette Coal Ltd.)	93P 019	Liard	93P/3W	coal	Sedimentary	6 ddh, 157 rdh, 20 000 m; road, 23 km; geophys
Redgold (Phelps Dodge Corp. of Canada)	93A 058	Cariboo	93A/6W	Au, Cu	Alkali porphyry	5 ddh, 537 m; geol; geochem; geophys
Steven (P.G. Paulson)	93G 024	Cariboo	93G/15E	W, Mo, Cu	Vein	3 ddh, 300 m
Sukunka (Canadian Coal Co.)	93P 011	Liard	93P/3W, 4W	coal	Sedimentary	reactivate production plans
Takla-Rainbow (Eastfield Res. Ltd.)	93N 082	Omineca	93N/11	Au, Cu	Alkali porphyry	8 ddh, 1242 m; 4 trenches, 200 m; geol; geochem; geophys; air geophys
Tam (Varitech Res. Ltd.)	93N 093	Omineca	94C/3,4	Au, Cu	Alkali porphyry	geol; geochem; geophys

Property (Operator)	MINFILE Number	Mining Division	NTS	Commodity	Deposit Type	Work Done
Taseko (Alpine Explr. Corp.)	93O 033	Clinton	92O/3W	Au, Cu	Porphyry	19 ddh, 11 480 m; geochem; geophys; air geophys
Tchentlo lake (Westmin Mines Ltd.)	93N 091	Omineca	93N/2	Au, Cu	Alkali porphyry	geol; geochem; 3 trenches, 500 m; road, 3.5 km
Tenakihi Creek (BP Res. Canada Ltd.)		Omineca	94C/3W	Au, Cu	Alkali porphyry	geol; geochem; geophys
Tez (Rio Algom Explr. Inc.)		Omineca	93K/15E	Au, Cu	Alkali porphyry	geochem; air geophys, 450 km
Tim (Liberty Gold Corp.)	92P 121	Clinton	92P/14E	Cu, Ag, Au	Porphyry	7 ddh; 12 pdh; geol
Trout (Goldrite Mining Corp.)	93F 044	Omineca	93F/10	Au, Ag	Epithermal	9 ddh, 1200 m; 4 pdh
WD (Cominco Ltd.)	93H 072	Cariboo	93H/6	Pb, Zn, Ag	Vein	3 ddh, 420 m; geophys
Webb (Moondust Ventures Inc.)		Omineca	93N/1W,1E	Au, Cu	Alkali porphyry	ddh; geol; geochem; geophys; air geophys; road
Wee (Cominco Ltd.)		Cariboo	93J/11	Pb, Zn, Ag	Replacement vein	2 ddh, 1000 m; geol; geochem; geophys
Windy (Placer Dome Inc.)	93J 024	Cariboo	93J/13	Au	Alkali porphyry	6 ddh, 684 m; 6 trenches, 365 m; geol; geochem; geophys; road, 3.5 km
Wingdam (Gold Ridge Res.)	93H 012	Cariboo	93H/4W	Au	Placer	decline; bulk sample
Witch (Rio Algom Explr. Inc.)	93N 164	Omineca	93N/1W,2E	Au, Cu	Alkali porphyry	geol; geochem; geophys

South Central District

Abba (C. Hagel)		Nicola	92I/2E,2W	Au, Cu	Vein	3 ddh, 415 m; 6 trenches, 244 m; geophys
Add 8, 10 (A. Babiy)		Kamloops	92I/9E	Au, Cu	Porphyry	3 ddh, 251 m; 5 pdh, 305 m
Ajax (Afton Oper. Corp.)	092INE012	Kamloops	92I/9W	Cu, Au	Porphyry	13 ddh, 3504 m; geochem
B.S. (J. Hilton)		Vernon	82L/7W	Ag, Pb, Zn, Au	Shear	1 ddh, 194 m
Ban 1 (A. Babiy)		Kamloops	92I/9E	Au	Porphyry	1 pdh, 46 m
Betty Lou (Better Res. Ltd.)	092ISE173	Nicola	92I/2E	Cu, Fe	Skarn	2 ddh, 630 m
Birch (New Global Res. Ltd.)	082M 021	Kamloops	82M/12W	Pb, Zn, Au, Ag	Massive sulphide	9 ddh, 304 m; 4 trenches, 50 m; geochem
Birk Creek (Falconbridge Ltd.)	082M 219	Kamloops	82M/5W	Cu, Ag, Pb, Zn, Au	Massive sulphide	8 ddh, 2377 m; 4 trenches, 800 m; geochem; geophys, 60 km
Brett (Huntington Res. Inc.)	082LSW110	Vernon	82L/4E	Au	Epithermal	3 ddh, 379 m; geochem
Brew (Bethlehem Res. / Goldnev Res.)	082M 085	Revelstoke	82M/9W	Cu, Pb, Zn, Ag	Massive sulphide	2 ddh, 129 m; airborne geophys, 1263 km
Camp #1 (L. Mear)		Kamloops	92I/9E	Cu, Au	Porphyry	1 ddh, 61 m; geochem
Cana (Minnova Inc.)		Kamloops	82M/4W	Au, Ag, Cu, Pb, Zn	Massive sulphide	6 ddh, 1716 m; geochem
Carmi Moly (Placer Dome Inc.)	082ESW029	Greenwood	82E/11E, 6E	Mo	Porphyry	3 ddh, 311 m
Chu Chua (Minnova Inc.)	092P 140	Kamloops	92P/8E	Cu, Ag, Au, Zn	Massive sulphide	11 ddh, 2314 m; geochem; geophys, 100 km
Clifton (R. Yorke-Hardy)		Vernon	82L/10E	Marble		7 ddh, 320 m; 3 trenches, 500 m
CM (Minnova Inc.)	092P 101	Kamloops	92P/8E	Au, Ag, Cu, Zn, Pb	Massive sulphide	3 ddh, 581 m; geochem; geophys, 75 km
Copper Mountain (Similco Mines Ltd.)	092HSE013	Similkameen	92H/7E	Cu, Au	Porphyry	181 ddh, 28 601 m; 35 trenches, 1981 m; geochem; geophys, 35 km
Craigmont (Craigmont Mines Ltd.)	092ISE034	Nicola	92I/2E	Magnetite	Tailings	1 pdh, 32 m; 8 cph, 210 m
Crystal Peak (Polestar Explr. Inc.)	082ESW107	Osoyoos	82E/5W	Garnet	Skarn	18 ddh, 595 m; bulk sampling
Dayton (Crown Res. Corp.)	082FSW022	Greenwood	82E/3E	Au, Ag	Skarn	9 pdh, 1372 m; geochem; geophys, 5 km
Eagle 4&5 (A. Babiy)		Kamloops	92I/8W	Au, Cu	Porphyry	1 ddh, 84 m; 1 pdh, 61 m
Elk (Placer Dome Inc.)	092HNE134	Similkameen	92H/16W	Au	Epithermal	62 ddh, 5428 m; 18 trenches, 1.3 km; geochem; geophys, 50 km

Property (Operator)	MINFILE Number	Mining Division	NTS	Commodity	Deposit Type	Work Done
Fairview (Oliver Gold Corp.)	082ESW007	Osoyoos	82E/4E	Au, Ag	Vein	11 ddh, 2465 m; geochem
Ford (Teck Expln. Ltd.)		Kamloops	82M/4E, 82L/13E	Cu, Pb, Zn, Ag	Massive sulphide	4 ddh, 861 m; geochem; geophys, 1.6 km
G&G 1 (Iota Expln. Ltd.)	092ISE120	Nicola	92I/2E	Au, Ag, Cu	Vein	3 ddh, 183 m
Galaxy (Getchell Res. Inc.)	092INE007	Kamloops	92I/9W	Cu, Au	Porphyry	12 pdh, 847 m; geochem
Gold Bridge (Golden Rule Res. Ltd.)	092JNE045	Lillooet	92J/15W	Au, Ag	Vein	3 ddh, 478 m; geophys, 5 km
Gold Ridge (R. Lacombe)	092ISW055	Kamloops	92I/4E	Talc, magnesite		4 ddh, 244 m; 7 trenches, 78 m
Golden Loon (Corona Corp.)		Kamloops	92P/8W	Au, Cu, Pb	Vein/porphyry	7 ddh, 691 m; 29 trenches, 865 m; geochem; geophys, 5.3 km
Goldrop (M. Shewchuk)	092HSE124	Similkameen	92H/7E	Cu, Zn, Ag,	Vein/shear	2 ddh, 186 m
Goldstream (Bethlehem Res. / Goldnev Res.)	082M 141	Revelstoke	82M/9W	Cu, Zn, Ag	Massive sulphide	geochem; geophys, 398 km
Haida (Teck Expln. Ltd.)	092P 136	Kamloops	92P/9W	Cu, Au	Skarn/porphyry	14 ddh, 1952 m; geophys, 54.5 km; geochem
Hat Creek Bentonite (Pacific Bentonite Ltd.)		Kamloops	92I/13E	Bentonite		8 auger, 46 m
Hfg-Wim (Gala Res. Ltd.)		Kamloops	82M/4E	Ag, Cu, Pb, Zn, Au	Massive sulphide	2 ddh, 227 m; geochem; geophys, 20 km
Highland Bell (Teck Corp.)	082ESW030	Greenwood	82E/6E	Ag, Au	Vein	62 u/g ddh, 3375 m
Highland Valley Copper (Highland Valley Copper)	092ISE045	Kamloops	92I/11E	Cu, Mo	Porphyry	11 ddh, 5303 m; geochem
Honeymoon (Minnova Inc.)		Kamloops	92P/9E,8E	Au, Ag, Cu, Zn, Pb	Massive sulphide	geochem; geophys, 90 km
J&J #5 (W. Groves)		Kamloops	92I/9W	Au, Cu	Porphyry	3 pdh, 183 m
J&L (Equinox Res. Ltd.)	082M 003	Revelstoke	82M/8E	Au, Ag, Pb, Zn	Sedex	250 m drifting; 10 ddh, 1500 m; geochem
Jewel (Corona Corp.)	082LSW065	Kamloops	82L/5E	Cu, Au	Porphyry	2 ddh, 258 m; geochem
JJ 4,7,8 (A. Babiy)		Kamloops	92I/9W	Au, Cu	Porphyry	3 pdh, 183 m; geochem
Kamad (Homestake Mining Canada Ltd.)	082M 025	Kamloops	82M/4W	Ag, Au, Cu, Pb, Zn	Massive sulphide	8 ddh, 2943 m; geophys, 500 m; geochem
Kamrose (C. Boitard)		Kamloops	92I/9W	Cu, Au	Porphyry	2 ddh, 221 m
Keystone (Bethlehem Res. / Goldnev Res.)	082M 088	Revelstoke	82M/8W	Cu, Zn, Pb, Ag	Massive sulphide	3 ddh, 572 m; geochem
Knut (Placer Dome Inc.)		Kamloops	92I/9W	Cu, Au	Porphyry	9 ddh, 1205 m
Last Chance (Minnova Inc.)	092INE062	Kamloops	92I/15W	Au, Ag, As, Hg	Epithermal	3 ddh, 614 m; 21 trenches, 454 m; geochem; geophys, 6 km
Lavington (B.P. Res. Canada Ltd.)		Vernon	82L/6E	Au, Ag, Pb, Zn	Shear	3 ddh, 396 m; road, 100 m
Lodestone (Tiffany Res. Inc.)	092HSE034	Similkameen	92H/7W	Pt, Fe	Magmatic	5 ddh, 610 m; trenching
Lucky Coon (Sirius Resource Corp.)	082M 012	Kamloops	82M/4E	Ag, Pb, Zn	Massive sulphide	13 ddh, 861 m
Lucky-Jura (Cominco Ltd.)	092HNE176	Similkameen	92H/9W	Cu, Au	Porphyry	17 pdh, 1469 m; geophys, 8 km
Lynx (Golden Sky Res. Inc.)	082LSE055	Vernon	82L/1W	Au	Vein	3 ddh, 183 m; geochem
Magna 1-10 (W. Spence)		Kamloops	82L/14W	Ag, Cu, Pb, Zn, Au	Massive sulphide	1 ddh, 152 m
Mam (Toba Gold Res. Ltd.)		Osoyoos	82E/4E	Au	Vein	15 m drifting; geochem
MC (Initial Developers Ltd.)		Kamloops	82M/12W	Cu, Pb, Zn	Massive sulphide	6 ddh, 630 m
Mica (Corona Corp.)	082M 190	Revelstoke	82M/15E	Ag, Pb, Zn, Cu	Massive sulphide	1 ddh, 67 m
Mila (Goldbank Ventures Inc.)	082M 151	Kamloops	82M/12E	Au, Ag, Cu, Pb, Zn	Massive sulphide	geochem; geophys, 35 km; linecutting, 20 km; 2 ddh, 366 m
Model Anne (Mad River Res. Inc.)	092INE039	Kamloops	92I/10W	Au	Epithermal	6 pdh, 479 m; geochem
Nickel Plate (Corona Corp.)	092HSE062	Osoyoos	92H/8E	Au	Skarn	45 ddh, 2850 m

Property (Operator)	MINFILE Number	Mining Division	NTS	Commodity	Deposit Type	Work Done
Nord 1 (A. Baby)		Kamloops	92I/9E	Au	Porphyry	1 pdh, 61 m
OK (J. Hilton)		Vernon	82L/7W	Ag, Cu, Pb, Zn, Au	Vein/shear	1 ddh, 61 m
Orofino Mountain (Orequest Consultants Ltd.)	082LSW113	Osoyoos	82E/4E,5E	Au, Ag	Vein	11 ddh, 730 m; 4 trenches, 50 m; geochem
Oz (Brenda Mines Ltd.)		Kamloops	92I/9W	Cu, Au	Porphyry	1 ddh, 305 m
Pooley Lake (Corona Corp.)		Kamloops	82L/12W, 92I/9E	Au	Vein/shear	2 pdh, 366 m; geochem
Rag-Happy-Days-Gs (Teck Corp.)	092INE045	Kamloops	92I/10E	Cu, Au	Porphyry	12 pdh, 872 m; geochem; geophys, 44 km
Rayfield (Brenda Mines Ltd.)	092P 005	Clinton	92P/6E	Cu, Au	Porphyry	12 ddh, 3340 m; geophys, 77 km
Richter (Minnova Inc.)		Osoyoos	82E/4E	Au, Ag	Vein	4 ddh, 466 m; geochem; geophys, 10 km
Rift (9041 Investments Ltd.)	082M 190	Revelstoke	82M/15E	Ag, Pb, Zn, Cu	Massive sulphide	7 ddh, 690 m; 2 trenches, 76 m; geochem
Road 4 (Naxos Res. Ltd.)		Kamloops	92I/9E	Au, Cu	Porphyry	6 pdh, 366 m
Rose (M. McElgunn)		Kamloops	92I/9E	Au	Porphyry	1 ddh, 46 m
RS-1 (Teck Explr. Ltd.)		Kamloops	82M/4E	Cu, Pb, Zn, Ag	Skarn	6 ddh, 766 m; 7 trenches, 382 m; geochem
Samatosum (Minnova Inc.)	082M 244	Kamloops	82M/4W	Ag, Cu, Pb, Zn, Au	Massive sulphide/ Vein	u/g devel; 47 ddh, 11200 m; 22 pdh, 500 m; geochem
Sil (E. Carson)		Osoyoos	82E/4E	Marble		6 ddh, 180 m
Standard Creek (Armeno Res. Inc.)	092JNE015	Lillooet	92J/10E	Au, Ag	Vein	10 pdh, 1287 m; geochem; geophys, 6.1 km
Stmp 1,2 (L. Mear)		Kamloops	92I/8W	Au	Porphyry	1 ddh, 91 m
Taweel Lake (Jaguar Equities Inc.)	092P 018	Kamloops	92P/9W	Au, Ag	Vein/shear	5 ddh, 396 m; geochem
Top (Commonwealth Gold Corp.)	082LSE017	Vernon	82L/2E	Au, Ag	Shear	110 m drifting; geochem
Tor (F. Wedekind/N. Proskin)		Similkameen	92H/10E	Au, Cu	Vein/shear	2 ddh, 305 m
Triple L (L. Loehr)		Kamloops	82L/12W,13W	Au	Vein	6 pdh, 67 m
Twin (Homestake Mining Canada Ltd.)	082M 020	Kamloops	82M/4W	Ag, Au, Cu, Zn, Pb	Massive sulphide	9 ddh, 3865 m; geophys, 2 km; geochem
Vault (Inco Gold Mgmt. Ltd.)	082ESW173	Osoyoos	82E/5E	Au, Ag	Epithermal	12 ddh, 2786 m; 2 trenches, 470 m
Whipsaw (Worldwide Minerals Ltd.)	092HSE073	Similkameen	92H/7E	Cu, Mo, Au	Porphyry/Vein	8 ddh, 683 m; geochem
Xen, Carol (Annax Ventures Inc.)		Vernon	82E/15E, 16W	Au, Ag, Pb, Zn	Vein/shear	6 ddh, 305 m; geochem; geophys, 5 km
Yalakom #2 (Consol Balsam Res. Corp.)		Lillooet	92O/2E	Au, Ag, Pb, Zn	Vein	1 ddh, 129 m
Zeb/Ed (Duchan Enterprises Ltd.)		Kamloops	82M/5E	Ag, Au, Cu, Zn, Pb	Massive sulphide	2 ddh, 335 m; 1 trench, 11 m; geochem; geophys, 5 km

Kootenay District

4 Seam (Crows Nest Res. Ltd.)	082GNW055	Fort Steele	82G/15	Coal		2 rdh, 367 m
Alpine (Cove Res. Corp.)	082FNW127	Slocan	82F/11	Au, Ag	Vein	4 ddh, 520 m
Bar (Swift Minerals Ltd.)		Fort Steele	82G/5W	Cu, Au	Breccia	1 ddh
Bar (Goldpac Investments Ltd.)		Fort Steele	82G/5W	Zn, Pb, Ag	Sedex	1 ddh, 1900 m
Bluebird (South Quarry) (Speers Construction Ltd.)	082JSW009	Fort Steele	82J/4E	Gy	Evaporite	16 rdh, 750 m
Cash (Kokanee Explr. Ltd.)	082GNW018	Fort Steele	82G/11W	Pb, Zn, Cu, Ag	Skarn	17 ddh, 2550 m
Castle Mountain (Fording Coal Ltd.)	082JSW011	Fort Steele	82J/2W	Coal		21 rdh, 3820 m

Property (Operator)	MINFILE Number	Mining Division	NTS	Commodity	Deposit Type	Work Done
Clearwater (P.M. Explr. Ltd.)	082FSW081	Nelson	82F/6E	Au, Ag	Vein	2 ddh, 100 m
Clubine (Yellowjack Res. Ltd.)	082FSW200	Nelson	82F/3W	Au, Ag, Pb	Vein	7 ddh, 854 m; 6 trenches; geochem; geophys
Corbin (Byron Creek Collieries)	082GNE001	Fort Steele	82G/7	Coal		57 rdh, 7500 m
David/Lew (Bapty Research Ltd.)		Fort Steele	82F/8E	Au	Shear	34 ddh, 1000 m
Eng (Kokanee Explr. Ltd.)		Fort Steele	82F/1E	Ag, Cu	Sedex	5 ddh, 1550 m
Estella (Cominco Ltd. /Kootenay Explr.)	082GNW008	Fort Steele	82G/13E	Zn, Pb	Vein	3 ddh
Four-J, Two-T (Domtar Gypsum)	082JSW009	Fort Steele	82G/13E	Gypsum	Evaporite	30 rdh, 850 m
Gold Creek (Bapty Research Ltd.)	082GSW034	Fort Steele	82G/2	Au	Vein	10 ddh, 1220 m
Golden Crown-Crown II (Attwood Gold Corp.)	082ESE032	Greenwood	82E/2	Au, Cu	Vein	34 ddh, 2100 m
Great Western Star (Pacific Sentinel Gold Corp.)	082FSW083	Nelson	82F/6W	Au, Ag	Shear related, porphyry	18 ddh, 4727 m; geochem; geophys
Hope (Kokanee Explr. Ltd.)	082FNW129	Slocan	82F/11W	Zn, Pb, Ag	Skarn	9 ddh, 255 m
Horseshoe Ridge (Crows Nest Res. Ltd.)	082GNW055	Fort Steele	82G/15W	Coal		4 rdh, 736 m
Jake/Snake (Dragoon Res. Ltd.)		Fort Steele	82G/4E	Ag, Pb, Zn	Vein	16 ddh, 1000 m
Jo-Anne Property (Snowwater Res. Ltd.)	082FSW222	Nelson	82F/8	Au, Ag	Volcanogenic	N/A
Joe Property (Fairbank Eng. Ltd.)	082FSW207	Nelson	82F/3W	Au, Ag, Pb, Zn	Quartz vein	3 ddh, 130 m
Katie (Noranda Explr. Co. Ltd.)	082FSW291	Nelson	82F/3W	Au, Cu	Porphyry	7 ddh, 1692 m; geochem; geophys
Kena (Noramco Mining Corp.)	082FSW237	Nelson	82F/6W	Cu, Au	Porphyry	4 ddh, 1063 m; geochem; geophys
Lake Mountain Area (Fording Coal Ltd.)	082JSW011	Fort Steele	82J/2W	Coal		6 rdh, 518 m
Lookout (White Knight Res. Ltd.)		Fort Steele	82G/5W	Au, Ag, Pb, Zn	Vein	6 ddh, 1000 m; trenching; geochem geophys
Lower Henretta Creek (Fording Coal Ltd.)	082JSW011	Fort Steele	82J/2W	Coal		38 rdh, 3625 m
Lower South Pit East (Crows Nest Res. Ltd.)	082GNW055	Fort Steele	82G/15W	Coal		5 rdh, 392 m
McNeil (Bapty Research Ltd.)	082GSW038	Fort Steele	82G/5W	Pb, Zn	Sedex	2 ddh, 915 m
Midnight Mine (Al Malovich)	082FSW130	Trail Creek	82F/4	Au	Vein	1500 tonnes shipped to mill at Northport, U.S.A.
Millie Mack (Bapty Research Ltd.)	082KSW051	Slocan	82K/4	Ag, Pb	Shear	3 ddh, 457 m
MSA North (Crows Nest Res. Ltd.)	082GNW055	Fort Steele	82G/15W	Coal		14 rdh, 2228 m
MSA North Extension (Crows Nest Res. Ltd.)	082GNW055	Fort Steele	82G/15W	Coal		9 rdh, 2051 m
Nevada Royal Canadian Group (Winchester Dev.)	082FSW088	Nelson	82F/6E	Au, Ag, W	Vein	2 ddh, 130 m (each?)
Ore Hill-Sumit (Yellowjack Res. Ltd.)	082FSW053	Nelson	82F/3E	Au, Ag, Pb, Zn	Replacement?	3 ddh, 613 m; geochem
Pine (Victoria Res. Corp.)		Fort Steele	82G/12W	Au, Cu	Vein	4 ddh, 575 m; geochem
Player Group (Formosa Res. Corp.)	082FSW085	Nelson	82F/6W	Cu, Au, Ag	Shear related	14 ddh, 1800 m
Price (Kokanee Explr. Ltd.)	082FNE056	Fort Steele	82F/9E	Au	Vein, breccia	7 ddh, 300 m
Rainbow - Tam O'Shanter (Minnova Inc.)	082ESE130	Greenwood	82E/2W	Au, Ag	Epithermal?	7 ddh, 1171 m; trenching; geochem; geophys
Rely (Pegasus Gold Inc.)	082FSW266	Nelson	82F/3	Au	Vein	5 ddh, 710 m; geochem; geophys
Roo (Teck Explr. Ltd.)	082GSW020	Fort Steele	82G/2W	Cu	Vein	8 ddh, 600 m
Rossland Claims (Bluebird) (Antelope Res. Inc.)	082FSW122	Trail Creek	82F/4W	Au	Vein	7 ddh, 1220 m
Shaft (Noramco Mining Corp.)	082FSW331	Nelson	82F/6	Au, Cu	Shear related, porphyry	6 ddh, 1653 m; geochem

Property (Operator)	MINFILE Number	Mining Division	NTS	Commodity	Deposit Type	Work Done
Silvana Mine (Treminco Res. Ltd.)	082FNW050	Slocan	82F/14	Ag, Pb, Zn, Cd	Vein	2 ddh, 1046 m; 6 u/g ddh, 1098 m
Silver Dawn (Rock Creek Res. Ltd.)	082ESE113	Greenwood	82E/2W	Pb, Zn, Ag	Replacement	30 ddh, 2030 m
Star (Barkhor Res. Inc.)	082FSE089	Nelson	82F/1E	Ag, Pb, Zn	Sedex/vein	9 ddh, 4082 m
Steeples (Bull River Mine) (R.H. Stanfield Group)	082GNW002	Fort Steele	82G/11W	Cu, Ag, Au	Vein	12 ddh, 5550 m; rtd, 1200 m
Strawberry Flats (Cameco)		Trail Creek	82F/4W	Au	Skarn	5 ddh, 430 m; 8 trenches; geochem
Sullivan Two (White Knight Res.)	082FSE077	Nelson	82F/2E	Pb, Zn, Ag	Sedex	9 ddh, 1500 m
Surelock (Mountain Minerals Co. Ltd.)		Golden	82K/9W	Ba	Fault breccia	bulk sample; exploration adit; mapping; geochem
Taylor Pit (Fording Coal Ltd.)	082JSE009	Fort Steele	82J/2W	Coal		9 rdh, 1808 m
True Blue (Minequest Explr. Assoc. Ltd.)	082FNE002	Slocan	82F/15W	Cu, Ag, Zn, Au	Stratabound massive sulphide	1ddh
Vine (Kokanee Explr. Ltd.)	082GSW035	Fort Steele	82G/5W	Pb, Zn, Cu	Vein	39 ddh, 8000 m
Whitewater (Teck Corp.)	082FSW222	Nelson	82F/6W	Au	Breccia	5 ddh, 650 m; geochem; geophys
Wilds Creek (Kokanee Explr. Ltd.)	082FSE005	Nelson	82F/2E	Zn	Stratabound	5 ddh, 1464 m

Southwestern District

Bruno (Doromin Res. Ltd.)	092L 229	Nanaimo	92L/1E	Cu, Ag, Au	Veins	11 ddh, 1400 m
Chemainus/Holyoak (Falconbridge Ltd.)	092B 037	Victoria	92B/13W, 92C16E	Au, Ag, Zn, Cu, Pb	VMS	24 ddh, 7202 m; geophys
Cimadoro (Doromin Res. Ltd.)	103F 052	Skeena	103F/1E, W	Zn, Pb, Cu, Au, Ag	Sedex?	9 ddh
Debbie (Westmin Res. Ltd.)	092F 078	Alberni	92F/2E, 7E	Au, Ag	Shears, Qtz-vein stockwork	4 ddh, 240 m; trenching; geophys
Expo(Hushamu) (Moraga Res. Ltd.)	092L 185	Nanaimo	92L/12W	Cu, Mo, Au	Porphyry	19 ddh, 4267 m; geophys; geochem; mapping
Harrison Gold(Abo) (Bema Gold Corp.)	092HSW092	New Westl.	92H/5E, W	Au	Vein stockwork	7 ddh, 2106 m
Lara (Minnova Inc.)	092B 110	Victoria	92B/13W	Au, Ag, Zn, Pb, Ag	VMS	49 ddh, 11 167 m; geophys; geochem
Merry Widow (Noranda Explr. Co. Ltd.)	092L 044	Nanaimo	92L/6E, W	Au, Ag, Cu	Skarn, manto	geophys; geochem; mapping; drilling
Mount Sicker (Minnova Inc.)	092B 001	Victoria	92B/13E, 13W	Cu, Au, Ag, Pb, Zn	VMS	14 ddh, 2400 m
Mount Washington (Better Res. Ltd.)	092F 116	Nanaimo	92F/11E, W; 14W	Au, Ag, Cu	Epithermal veins, Breccias	6 ddh, 284.4 m
Quet (Noranda Explr. Co. Ltd.)	092GNE027	New Westl.	92G/9W, 16W	Au, Ag, Zn, Pb, Cu	Veins, replacement	7 ddh, 1251.9 m; geophys; geochem; mapping
Red Dog (Moraga Res. Ltd.)	092L 200	Nanaimo	92L/12W	Cu, Au, Mo	Porphyry	10 ddh, 1890 m
Seneca (Minnova Inc.)	092HSW013	New Westl.	92H/5W	Cu, Zn, Pb, Au, Ag	VMS	geochem; mapping; drilling
Southeaster (Clear Creek Res. Ltd.)	103G 004	Skeena	103F/8E, 103G/5	Au, Ag	Epithermal Veins, Breccias	18 ddh, 940 m; trenching
Spud Valley (McAdam Res. Inc.)	092L 211	Alberni	92L/2W	Au, Ag	Veins	u/g drifting; bulk sampling; pilot mill
Tsable River (Western Canadian Mining Corp.)	092F 333	Nanaimo	92F/7W, 10W	Coal	Sedimentary	drilling
Wann (Moraga Res. Ltd.)	092L 087	Nanaimo	92L/12E, W	Cu, Mo, Au	Porphyry	17 rcdh, 1867 m

pcdh = percussion drill hole
rcdh = reverse circulation drill hole
rdh = rotary drill hole
ddh = diamond drill hole
VMS = Volcanogenic massive sulphide
grd = ground
u/g = underground
sfc = surface

NORTHWESTERN DISTRICT

By D.V. Lefebure and M.L. Malott
District Geology, Smithers

INTRODUCTION

Northwestern British Columbia was one of the most active mineral exploration areas in the country in 1990, with expenditures in excess of $110 million. This amounts to more than 60 per cent of all the dollars spent on exploration in the province. More encouraging results from the **Eskay Creek** property generated much of the action as 34 companies exploring in the Stewart - Iskut River area spent more than $51 million. The current surge of mineral exploration has lasted four years and has found numerous new mineral occurrences and defined new deposits.

The number of exploration programs increased in most areas throughout the Northwestern District. More companies were active in the region extending north from the Iskut River to the Galore Creek and Kiniskan Lake areas. Precious metal veins continued to be the principal target with some companies searching for polymetallic porphyry and volcanogenic massive sulphide deposits.

Construction of the surface facilities and development of the underground workings for the **Snip** gold deposit of Cominco Ltd. were almost complete by the end of the year. Mining of this deposit will start in early 1991. **Windy Craggy** and **Sulphurets** were the other two most advanced, active projects.

Eight mines continued production and one operation closed in 1990. The **Bell**, **Equity Silver**, **Cheni Gold**, **Shasta**, **Premier Gold**, **Golden Bear** and **Cassiar** mines operated throughout the year. Cassiar Mining Corporation removed the last ore from its open pit in June and by November had begun underground mining of asbestos fibre from the newly developed **McDame** deposit. The depletion of ore reserves at the **Johnny Mountain** gold mine led to its closure in September.

Crows Nest Resources Limited proposed mining plans for the Telkwa coal deposits; however, late in the year the company announced it was planning to sell its coal assets. The number of placer mining operations in the district declined 20 per cent from 1989, continuing a trend which started in 1988.

HIGHLIGHTS

- Geddes Resources Ltd. spent $11 million on the **Windy Craggy** copper deposit to complete a drilling program, mine planning studies and bulk sampling.
- At the **Midway** silver-lead-zinc deposit Regional Resources Ltd. extended the workings to the Discovery zone and carried out an underground drilling program.
- Cassiar Mining Corporation completed the development of the **McDame asbestos orebody** and started underground mining.
- Drilling on the **Tulsequah Chief property** resulted in a 50-metre intersection of precious metal-rich massive sulphides from the H lens.
- For the first time since the early 1970s, a large drilling program was completed on the **copper-gold Galore Creek deposit**.
- Cominco Ltd. started construction and underground development at the **Snip gold deposit** with production planned for early 1991.
- On the **Eskay Creek property** Calpine Resources Inc. spent $27 million to complete 485 diamond-drill holes, underground development and bulk sampling, with only helicopter access to the claims.
- Polymetallic mineralization was found on the **Ski, GNC and Sib properties** which are adjacent to Eskay Creek.
- Placer Dome Exploration Ltd. drilled 65 holes on the **Kerr copper-gold porphyry deposit**.
- Feasibility studies completed on the **Sulphurets gold-silver property** indicated the West zone was not economically attractive at current metal prices.
- Westmin Mining Ltd. signed a joint venture agreement with Tenajon Resources Corporation concerning the **Silver Butte deposit**.
- Underground development and exploration on the Cliff Creek zone at the **Cheni Gold mine** proved disappointing as ore reserves in the zone were reduced by 45 per cent.
- Exploration by Noranda Minerals Inc. at the **Bell mine and Granisle pit** outlined mineralization which

Plate 2-1. Geddes Resources Ltd. continued to work on developing the huge Windy Craggy copper deposit. The company completed numerous studies to assess the impact of a mine in this remote location, including field tests on the potential for developing acid drainage show in the picture above.

could significantly increase the reserves available for the Bell mill.

TRENDS

The mineral industry in northern British Columbia underwent a number of changes in 1988.

- Major companies became much more important.
- Companies developing major mines have kept the public more completely informed about their activities.
- Land-use issues proliferated and their potential impact on mineral exploration increased dramatically.

In the late 1980s mineral exploration was dominated by junior companies while the major companies played a secondary role. This year there was a marked change as major companies, such as Cominco Ltd., Homestake Mineral Development Co., Noranda Inc., Placer Dome Inc. and Westmin Resources Limited completed large exploration programs. In the 1990s it would appear that the major companies will play a larger role in exploring for mineral deposits and developing new mines.

In 1988, for the first time in British Columbia, a company, Geddes Resources Ltd. toured the province to explain its mining plans for the Windy Craggy copper deposit. While many projects do not require this level of public discussion, it is anticipated that in the next decade there will be increasing demands for information from mineral industry companies about proposed mine developments.

The pressure on British Columbia's land base also began to show in 1988, with a wide variety of new areas proposed for consideration as Wilderness Areas, Local Resource Use Plans, Recreation Corridors, Parks and other designations. Most of these initiatives will not alienate the land from mineral exploration. They will, however, place more constraints on how mineral exploration and mining can be carried out. During the next decade the mineral industry will be increasingly asked to participate in land-use decisions.

The regional infrastructure in northwestern British Columbia continued to improve with the completion of the Bob Quinn airstrip in August. Numerous companies were using the airstrip by the end of the field season and as many as five helicopters were based at the strip. Nearby Bob Quinn Lake will be the starting point for the 92-

Plate 2-2. Located near the Yukon border, a $7.5 million underground development and drilling program was completed on the Discovery Zone of the Midway manto deposit.

Plate 2-3. Underground development at Eskay Creek started in June and include mining of a bulk sample (pictured above) for metallurgical tests.

Plate 2-4. In the Toodoggone the Sable Resources Ltd. started to underground mining of the JM and Creek zones from two underground levels. The portal to the Creek zone is shown above.

kilometre Iskut road. Field studies for this road were completed in October. It will follow the Iskut River to the Bronson Creek airstrip (near Cominco's Snip project) with a spur along Volcano Creek to provide access to the Eskay Creek property. Construction of the Iskut Road is planned to start in 1991.

OPPORTUNITIES

Areas with excellent exploration potential are still open for staking throughout the Northwestern District. Some of the more attractive exploration targets are the porphyry copper-gold deposits in the Stikine and Quesnel terranes, volcanogenic massive sulphide deposits in the Alexander and Stikine terranes, and mesothermal gold deposits in the Alexander Terrane.

Porphyry copper-gold deposits, such as Galore Creek, Kerr and the Bell orebody, are found throughout the Stikine Terrane. Current exploration is focused on the Quesnel trough and northern part of the Stikine Terrane. There is excellent potential in southern Stikinia, particularly in the Babine Lake area. The northern extension of the Quesnel Terrane into the Dease Lake area also holds some promise.

A number of volcanic belts in the Northwestern District are underexplored for volcanogenic massive sulphide deposits. Recent exploration results at Windy Craggy and the Tulsequah Chief mine, as well as the development of the new Greens Creek mine in Alaska, have generated more interest in this deposit type. Areas with massive sulphide potential include the Tatshenshini River, Cry Lake, Dundas Island and Ecstall River districts.

Current work on the Eskay Creek deposit suggests it is primarily a volcanogenic massive sulphide deposit with very high precious metal contents. Exploration for similar deposits in the Stikine Terrane is attracting a lot of exploration funding. Middle Jurassic submarine strata elsewhere within this terrane are prospective for similar deposits.

The North Coast was again one of the quietest areas in the province with respect to mineral exploration, despite the potential to find major mesothermal gold veins.

MINERAL EXPLORATION

Mineral exploration expenditures for the Northwestern District soared to $110 million, more than 60 per cent of the provincial total (Figure 2-1). More than $51 million was spent in the Stewart - Iskut River "Golden Triangle", where the focus was on the $20 million Eskay Creek program. Except for the Windy Craggy project,

virtually all the other large projects were located within the Stikine Terrane. Excluding the Eskay Creek and Windy Craggy projects, the average expenditure for a project with drilling or underground development was $644 000.

A total of 622 Notices of Work were submitted in 1990 for mineral exploration, up 40 per cent from 1989 (Figure 2-2). Eight per cent of the Notices were revisions to previously submitted programs. A total of 99 major projects in the district were explored by drilling, underground development or major surface programs (Figure 2-3). A complete list of all the major exploration programs is presented in Table 2-1 and Figures 2-4 and 2-5. The following material is a review of the 1990 exploration activity completed in the various parts of the Northwestern District. The descriptions start with properties located in the northwest and move generally to the southeast.

TATSHENSHINI RIVER AREA

In the extreme northwestern corner of the province a $12 million program was completed on the **Windy Craggy** property of Geddes Resources Ltd. Windy Craggy is a volcanogenic massive sulphide deposit with similarities to both the Besshi and Cyprus types. The mineralization is hosted by Triassic clastic sediments and mafic flows and sills. It occurs near the transition from a predominantly clastic host to overlying mafic volcanic rocks. The North and the South orebodies have a combined strike length of 1.6 kilometres and extend 600 metres below the surface. Each of the zones has a surface expression of supergene copper sulphide enrichment overlain by gossan caps rich in gold and silver. Reserves are currently estimated at 210 million tonnes of 1.59 per cent copper at a 0.5 per cent copper cut-off (Table 2-1).

Environmental and geotechnical studies necessary for mine planning, as well as drifting and drilling, were completed in 1990. Drilling between the North and South zones located the new Ridge zone which has been traced along strike for 390 metres. Geddes Resources has revised its Stage 1 report for the provincial government to better address several issues, including potential acid rock drainage.

Seventy kilometres northeast of Windy Craggy, Goldbank Ventures Ltd. outlined a volcanogenic massive sulphide target on the **Bar** property. The baritic zone contains auriferous pyrite, sphalerite, chalcopyrite, galena and argentite mineralization.

ATLIN

On the **Atlin Ruffner** property of Homestake Mineral Development Company, exploration focused on the South Vulcan zone and #6 vein. Both these zones are hosted by the Fourth of July Creek batholith. The South Vulcan Creek zone is characterized by quartz veins and stockworks in quartz-sericite-altered granodiorite of the Fourth of July Creek batholith. One mineralized interval returned values of 260.2 grams per tonne silver over 0.45 metre. Silicified, chloritized and sheared mafic dikes host the #6 vein which has a strike length exceeding 1600 metres. The best assay from the eastern extension of the vein is an intercept grading 36.3 grams per tonne silver, 20.5 per cent lead and 6.5 per cent zinc over a true width of 0.6 metre.

Noranda Exploration Company, Limited explored for lode gold on the **Pinelode** property on Pine Creek, an important placer gold producer. The property is believed to be underlain by gold-bearing listwanitic alteration zones which occur at a contact between ultramafic intrusive rocks and andesitic volcanic rocks. Unfortunately the drilling intersected only barren ultramafic rocks.

Northwest of Atlin, between Bennett and Tutshi lakes, Lodestar Explorations Inc. discovered two large hydrothermally altered zones in metamorphic rocks of the Yukon Group on the **Pavey** property. Called the Skarn and Cowboy zones, they were drilled and returned assays ranging from 1.23 grams per tonne gold over 29.9 metres to 9.09 grams per tonne gold over 2.99 metres.

Approximately 45 kilometres west of Atlin, on the **TP (Teepee)** property, Cyprus Gold Ltd. drilled several veins cutting Proterozoic-Paleozoic metamorphic rocks close to the Llewellyn fault.

CASSIAR

In the Cassiar mining camp **Total Energold Corporation** used geophysical surveys over its extensive property holdings to trace thrust contacts between argillite and volcanic-chert units within the Sylvester allocthon. These thrust faults were systematically drilled to identify alteration zones and find hidden ore zones. The Bain vein, discovered in 1989, was extended another 300 metres, for a total of strike length of 500 metres, and remains open to the east. Drilling located two other weakly mineralized veins on the Erickson property.

The **Midway** manto deposit is located just south of the Yukon border and 85 kilometres west of Watson Lake. The 1990 exploration program consisted of extending the underground workings by a decline from the Silver Creek zone to the Discovery zone, to provide access for more than 5000 metres of underground drilling. The deposit is hosted by McDame Group carbonates and occurs up to 30 metres below the contact with the overlying Earn Group shale. Mineralization consists of an irregular system of pipes filled with pyrite, sphalerite, galena, pyrrhotite, friebergite, arsenopyrite, pyrargyrite

MAJOR EXPLORATION PROGRAMS

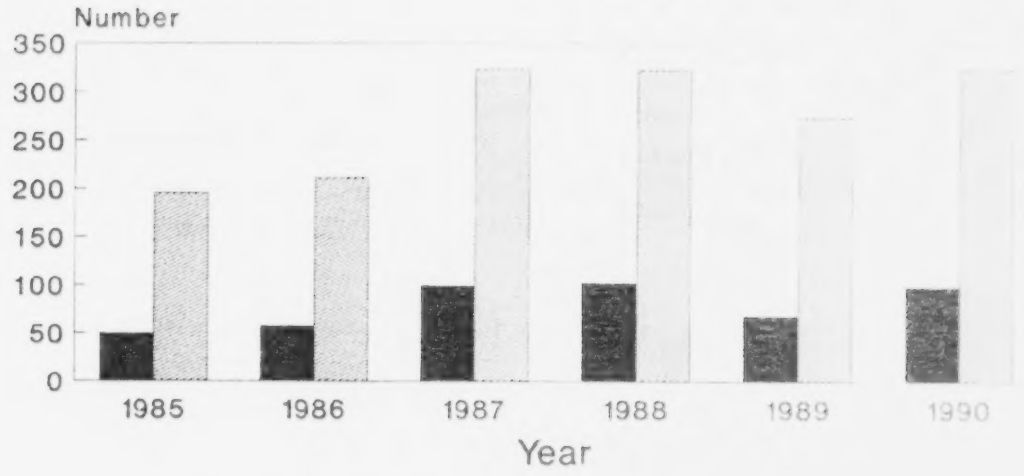
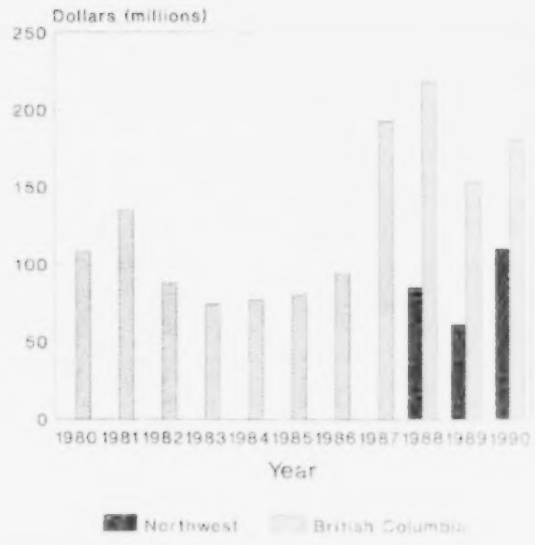


Figure 2-3

MINERAL EXPLORATION EXPENDITURES



Provincial figures for 1980 to 1989 provided by B.C. and Yukon Chamber. 1990 figure from District Geologists.

Figure 2-1

MINERAL NOTICES OF WORK Northwestern British Columbia

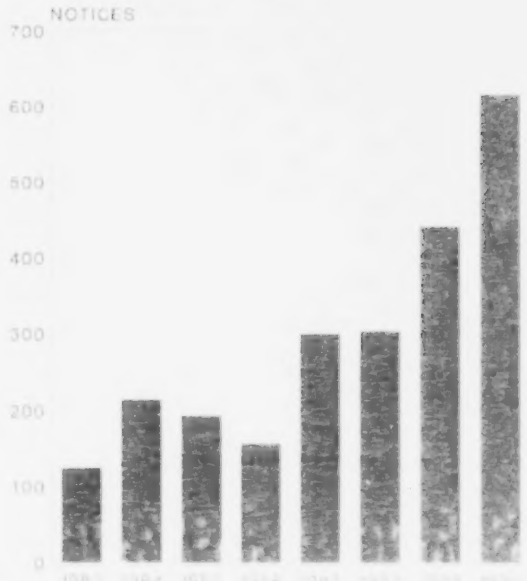


Figure 2-2

Figure 2-4

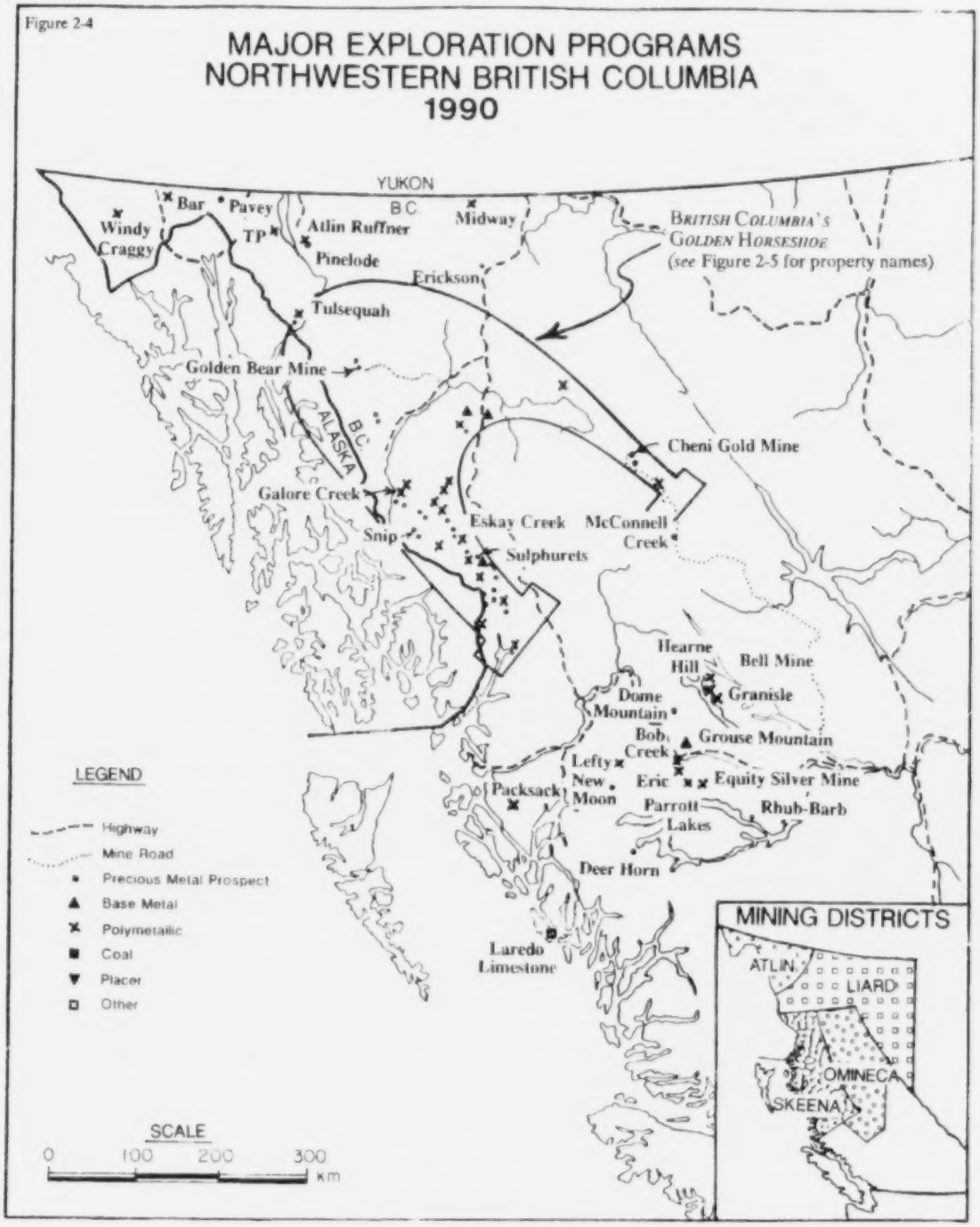

MAJOR EXPLORATION PROGRAMS
NORTHWESTERN BRITISH COLUMBIA
1990
YUKON
B.C.
ALASKA
B.C.
Bar
Windy
Craggy
Pavey
TP
Atlin Ruffner
Pinelode
Midway
Erickson
Tulsequah
Golden Bear Mine
Cheni Gold Mine
Galore Creek
Snip
Eskay Creek
McConnell Creek
Sulphurets
Hearne Hill
Bell Mine
Granisle
Dome Mountain
Bob Creek
Grouse Mountain
Lefty
New Moon
Eric
Equity Silver Mine
Packsack
Parrott Lakes
Rhub-Barb
Deer Horn
Laredo Limestone
BRITISH COLUMBIA'S GOLDEN HORSESHOE
(see Figure 2-5 for property names)
LEGEND
Highway
Mine Road
Precious Metal Prospect
Base Metal
Polymetallic
Coal
Placer
Other
SCALE
0 100 200 300
km
MINING DISTRICTS
ATLIN
LIARD
OMINECA
SKEENA

TABLE 2-1
DEVELOPMENT STAGE PROJECTS
NORTHWESTERN DISTRICT, BRITISH COLUMBIA

PROJECT	COMPANY	ORE RESERVES
Windy Craggy	Geddes Resources Ltd.	143 Mt; 1.69% Cu, 0.084% Co, 0.2 g/t Au 3.41 g/t Ag (proven and probable)
Eskay Creek	Corona Corp., Placer Dome Inc.	3.967 Mt; 26.4 g/t Au 998.4 g/t Ag, Pb,Zn,Cu (probable and possible)
Sulphurets	Newhawk Gold Mines Ltd., Granduc Mines Limited	West Zone 648.6 kt; 14.77 g/t Au, 675.4 g/t Ag (proven plus probable)
Silver Butte	Tenajon Resources Corp., Westmin Mining. Ltd.	279.4 kt; 17.31 g/t Au 36.68 g/t Ag
Telkwa Coal	Shell Canada Ltd.	South Telkwa: 21.8 Mt North Telkwa: 13.2 mt bituminous coal

and tin and lead sulphosalts. The geology is disrupted by north-trending faults and several new mineralized zones were intersected by drilling. Drilling in the early 1980s resulted in estimated geological reserves of 1.185 million tonnes grading 410 grams per tonne silver, 9.6 per cent zinc and 7 per cent lead within the Discovery and Silver Creek zones.

BRITISH COLUMBIA'S "GOLDEN HORSESHOE"

The Stewart-Iskut River and Toodoggone River areas are only part of the northern Stikine Terrane which has potential for major precious metal deposits related to island-arc volcanic centres. The Galore Creek, Kiniskan Lake and other areas have well-demonstrated potential for large gold, copper and silver deposits. This area can be considered to be British Columbia's "Golden Horseshoe" because northern Stikinia forms a horseshoe-shaped border to the Bowser basin (Figure 2-4). This area includes the much smaller "Golden Triangle" which has Johnny Mountain, Sulpurets and Stewart at the corners.

Exploration programs in the Tulsequah River, Tatsamenie Lake, Dease Lake, Mount Edziza, Galore Creek, Forrest Kerr, Iskut River, Eskay Creek, Unuk River, Sulphurets, Stewart, Alice Arm and Toodoggone areas all lie within the Golden Horseshoe. Expenditures on 77 major exploration programs within the Horseshoe were in excess of $83 million in 1990.

TULSEQUAH RIVER - TATSAMENIE LAKE AREA

The **Tulsequah Chief** property of Cominco Ltd. and Redfern Resources Ltd. is located 65 kilometres northeast of Juneau, Alaska. The 1990 drilling program was designed to test for the new H ore lens lying above the previously known A and B lenses. Drill intersections of the horizons were approximately 300 metres deeper than last year's drilling. In July, Cominco intersected 50 metres of massive sulphides grading 2.92 per cent copper, 1.58 per cent lead, 9.09 per cent zinc, 3.83 grams per tonne gold and 170 grams per tonne silver in the H lens. Other massive sulphide intersections were made during the program, although in many cases they were partially displaced by a diorite dike. The 1990 results are expected to boost the geologically indicated reserves reported by Redfern Resources in 1989 (*see* Table 2-2).

Just across the Tulsequah river, at the old **Polaris-Taku** gold mine, Suntac Minerals Corporation completed a drilling program in early 1990 which was followed up later in the year with surface surveys by Estey Agencies Ltd. The early program tested the strike and down-dip continuity of the east-trending C vein, a quartz-carbonate shear zone containing veins impregnated with auriferous arsenopyrite. Reported assay results from drill intersections varied between 2.16 grams per tonne gold over 9 metres to 51.02 grams per tonne gold over 3 metres. The drilling added 332 000 tonnes to the reserves which now total 803 765 tonnes (probable and possible) grading 16.11 grams gold per tonne.

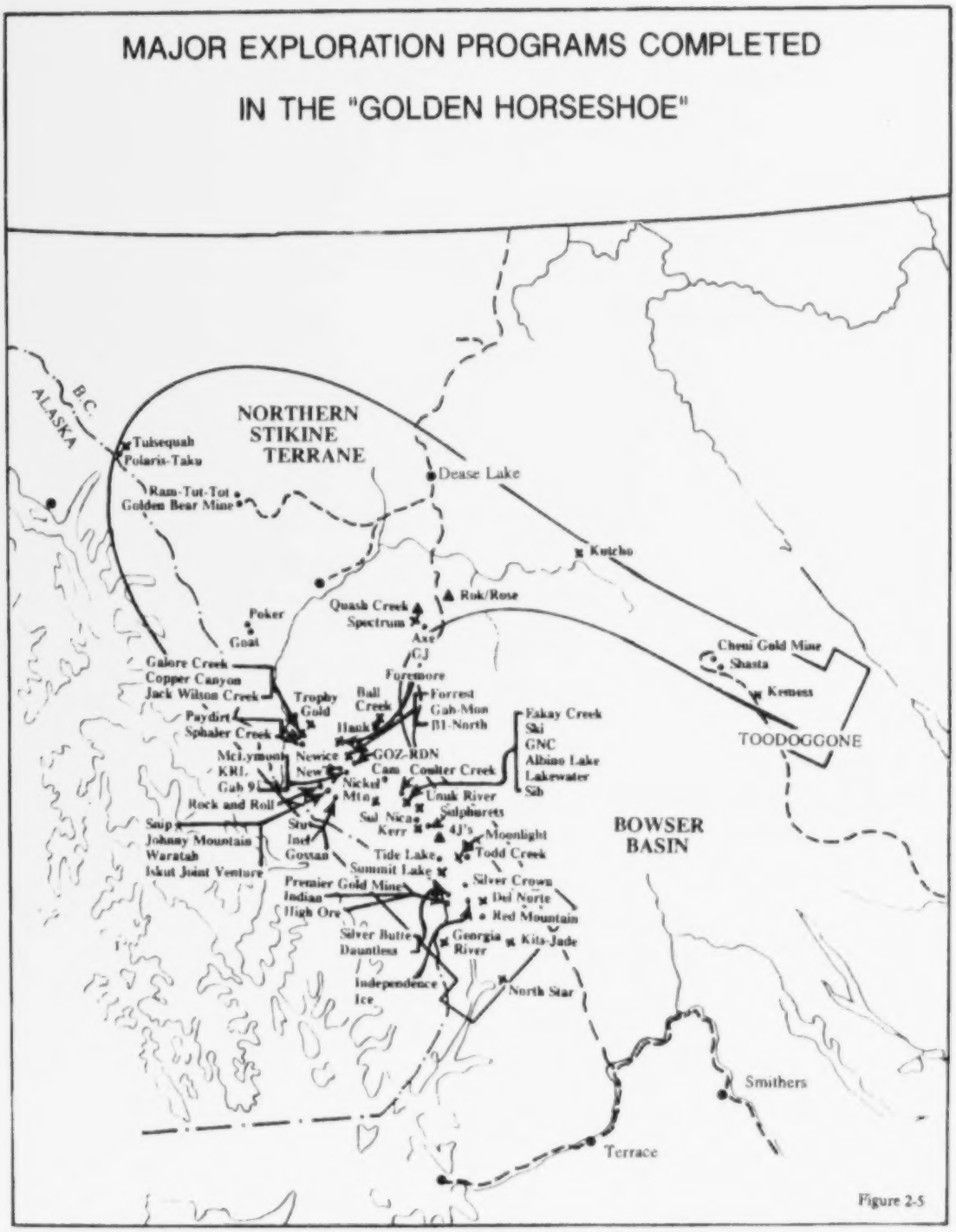

MAJOR EXPLORATION PROGRAMS COMPLETED
IN THE "GOLDEN HORSESHOE"
B.C.
ALASKA
NORTHERN
STIKINE
TERRANE
Tulsequah
Polaris-Taku
Ram-Tut-Tot
Golden Bear Mine
Dease Lake
Kutcho
Rok/Rose
Quash Creek
Spectrum
Poker
Goat
Axe
GJ
Foremore
Galore Creek
Copper Canyon
Jack Wilson Creek
Trophy
Gold
Ball
Creek
Forrest
Gah-Mon
B1-North
Paydirt
Sphaler Creek
Hank
Eskay Creek
Ski
GNC
Albino Lake
Lakewater
Sib
McLymont
KRL
Gab 9
Newice
New
GOZ-RDN
Cam
Coulter Creek
Nickel
Mtn
Unuk River
Sulphurets
Rock and Roll
Snip
Johnny Mountain
Wolfatah
Iskut Joint Venture
Sul
Kerr
Nicao
4J's
Moonlight
Todd Creek
Tide Lake
Summit Lake
Premier Gold Mine
Indian
High Ore
Silver Crown
Del Norte
Red Mountain
Silver Butte
Dauntless
Georgia
River
Kits-Jade
Independence
Ice
North Star
Cheni Gold Mine
Shasta
Kemess
TOODOGGONE
BOWSER
BASIN
Smithers
Terrace

Figure 2-5

TABLE 2-2
ADVANCED EXPLORATION PROJECTS,
NORTHWESTERN DISTRICT, BRITISH COLUMBIA

PROJECT	COMPANY	ORE RESERVES
Midway	Regional Resources Ltd.	1 185 Mt; 410 g/t Ag, 7.0 % Pb, 9.6 % Zn
Tulsequah	Cominco Ltd., Redfern Resources Ltd.	5.26 Mt; 1.6% Cu, 1.31% Pb, 7.03% Zn, 2.74 g/t Au, 100.5 g/t Ag
Erickson Gold	Total Energold Corp.	Erickson:18.3 kt; 14.1 g/t Au Cusac, Michelle Ext.: 25 kt; 34.29 g/t Au, 12.3 g/t Ag
Kerr	Western Canadian Mining Corp., Sulphurets Gold Corp.	114.3 Mt (drill inferred); 0.61% Cu, 0.27 g/t Au, 1.71 g/t Ag
Dome Mountain	Teeshin Resources Ltd. Canadian-United Minerals Inc.	293.9 kt; 12.17 g/t Au, 80.23 g/t Ag

At the **Golden Bear** mine there was drilling north and south of the Bear main zone to locate extensions to the orebody. Results indicate that the host structure extends a considerable distance to the south. This area is largely untested. Drill results to the north indicate the potential for significant mineralization hosted in an en echelon fault which parallels the Bear Mine fault. Approximately 10 kilometres northwest of the Golden Bear mine, Armeno Resources Inc. investigated a zone of silicification and brecciation extending 1.5 kilometres along a limestone-phyllite contact on the **Tut** property. Strongly anomalous gold, silver, arsenic and antimony values were returned from the silicified zone which can be up to 50 metres thick.

In the Barrington River region, two projects were completed in an area underlain by interlayered volcanics and sediments of the Stuhini Group. These conformable units have been intruded by a multiphase syenitic intrusion which is enveloped by a large hornfels zone. The syenite has a variety of associated mineral occurrences, including porphyry copper-gold mineralization. On the **Poker** property surveys were completed by Dryden Resource Corporation to try to locate the source of glacial boulders found below Limpoke Glacier. Drill holes testing UTEM and magnetic anomalies on the south side of the valley produced no significant results. On the nearby **Goat** property the exploration program concentrated on known showings. Fifteen zones have significant concentrations of gold-copper mineralization, while numerous lenses of massive arsenopyrite and pyrrhotite with high gold values over narrow widths were found in other areas.

DEASE LAKE - MOUNT EDZIZA AREA

At the **Kutcho** property, located approximately 100 kilometres southeast of Dease Lake, Homestake Mineral Development Company completed a major drilling program over virtually an entire greenstone belt. The target was volcanogenic massive sulphide deposits similar to the **Kutcho Creek** deposit. Favourable hydrothermal alteration was found at numerous locations on the property, however, a pyrite bed 1 to 2 metres thick was the only new horizon discovered. It was intersected in four holes over a 3.5-kilometre strike length along the southwestern side of the property. No new mineralized sulphide lenses were defined.

There were a number of exploration programs in the Kiniskan Lake area. Near Eddontenajon, Manchester Resources Corporation drilled the Main showing on the **Rok** property. The third hole intersected chalcopyrite mineralization near the top of the hole, including a 6.0-metre interval of 4.25 per cent copper and 7.13 grams gold per tonne. Farther to the west, on Teck Corporation's **Quash Creek** property, drilling was focused on a strong copper-gold soil anomaly in the vicinity of a porphyritic stock intruding Stuhini Group volcanics.

On the nearby **Spectrum** property, the target is porphyry gold-copper mineralization associated with an altered zone in Stuhini Group volcanics and sediments. Previous work on the property was concentrated on the Red Dog zone where earlier drilling had outlined 1.8 million tonnes of 1.37 grams per tonne gold . In 1990, initial drilling by Columbia Gold Mines Ltd. tested the 500 Colour, Porphyry and QC zones. These zones trend northerly and dip steeply. They are associated with a large

alteration system of intensely silicified and carbonatized andesitic tuffs containing pyrite, arsenopyrite and visible gold.

Adjoining the Quash property to the south are the **Axe** claims of Ascot Resources Ltd., and farther south, the **Axe** property of Beauchamps Exploration Inc. The Axe properties cover Upper Triassic volcanics and coeval subvolcanic intrusives. Positive results were obtained on the Ascot property where high-grade copper mineralization with significant gold and arsenic values was discovered over an area 500 by 400 metres at Trevor Peak. Nearby, on the **GJ** property, a similar copper-gold porphyry target, with diorite to latite dikes and subvolcanic plugs, is hosted by coeval upper Triassic volcanics and cherts, to siltstones of possible Paleozoic age. The drilling, by Ascot Resources Ltd., tested along strike from known mineralization as well as several new targets. Results were considerably poorer than in earlier drilling programs, with the best interval grading 0.18 per cent copper and 0.34 gram per tonne gold over 27 metres.

Galore Creek Area

The Galore Creek district was an active area with exploration for porphyry and vein deposits continuing. A two-phase drilling program was completed by Mingold Resources Inc. on the **Galore Creek** deposit. Initial drilling tested several gold targets peripheral to the main deposits. The second phase was concentrated on the Southwest zone.

The Copper Canyon showing immediately to the east of Galore Creek, was drilled by Consolidated Rhodes Resources Ltd. Preliminary reserves of 29 million tons grading 0.7 per cent copper, 9.33 grams per tonne silver and 0.311 gram per tonne gold were outlined in 1957. The 1990 drilling repeated some of the old holes and returned similar values over widths of tens to hundreds of metres. Other holes stepped out to define the margins of the deposits.

On the **Trophy Gold** property drilling tested the Ptarmigan zone and the N110 Grid, a large copper-gold soil anomaly coincident with induced polarization chargeability highs. Gigi Resources Ltd. reported gold and silver values from the Ptarmigan zone over widths of approximately 1 metre. Low-grade gold mineralization was intersected on the N110 Grid.

The **Jack Wilson Creek** property is located west of Galore Creek. It is underlain by strongly sheared, Triassic Stuhini volcanics and dioritic intrusives which are pervasively altered to chlorite and epidote, and locally to quartz, anhydrite and potassium feldspar. The strongest copper-gold mineralization appears to be at the juncture of fractures, faults and shears. The mineralization and associated alteration appears consistent with a high-level copper-gold porphyry model. The best copper-gold values found to date are in the Central zone where a 45-metre section grades 0.237 per cent copper and 0.377 gram per tonne gold .

On the fringes and south of the Galore Creek area the **Paydirt** and **Sphaler Creek** properties were explored for veins. At Sphaler Creek, Pass Lake Resources Ltd. drilled on coincident geophysical and geochemical anomalies on the Deluxe zone without intersecting any significant mineralization. Silver Standard Resources Inc. carried out an extensive mapping, geochemical and geophysical program on the Paydirt property.

Forrest Kerr Area

The **Ball Creek** property is a porphyry copper-gold system in an Upper Triassic package of andesitic tuffs, flows and epiclastics intruded by a swarm of subparallel, north-trending Late Triassic monzonite dikes. A circular hypabyssal monzonite stock is also believed to underlie the property. Alteration consists of a potassic core (Camp zone) grading outwards into concentric phyllic and then propylitic shells. Earlier drilling outlined a large area of promising gold and copper values. The 1990 drilling tested geophysical and geochemical targets, unfortunately results were not encouraging.

On the nearby **Hank** property, owned by Lac Minerals Ltd., the lower alteration zone was tested along strike for the extension of the broad pervasive area of pyritic alteration with quartz stringers and veins containing galena, sphalerite, chalcopyrite and pyrite which characterizes the zone. No significant zones of gold mineralization were found.

Massive sulphide boulders in the **More Creek** area generated considerable excitement as several companies searched for their source. Cominco Ltd. followed up on its 1989 surface exploration program and drilled five holes through Foremore Glacier. The holes were to test for the bedrock source of massive sulphide boulders at both toes of the glacier. The stratigraphic sequence (from top to bottom) intersected in drilling is: gabbro, laminated argillite, limy tuff, graphitic schist, chert, maroon and green intermediate pyroclastics with interfoliated quartz-sericite-pyrite schist. The sequence has undergone two periods of penetrative deformation and is thought to be Devono-Mississippian in age. On the adjoining **GOZ-RDN** property to the south, Noranda Exploration Company, Limited followed up another boulder train. Drill testing of selected targets yielded mixed results which ranged from 7.89 grams per tonne gold over 7.85 metres to 11.6 grams per tonne gold over 4.4 metres.

Avondale Resources Ltd. continued work on a number of prospects on the **Forrest Kerr** property, including the Creek showing. The latter is a large area of gold-sil-

ver-copper mineralization within a quartz stockwork. Twenty-four holes were drilled on eight targets.

Five gold-bearing zones were explored on the **Gab-Mon** property of Consolidated Seagold Ltd., including the extension of the Northwest zone on the **McLymont** property. On the Northwest zone low gold values were obtained in fractures in Mississippian volcanics, but no limestone units were found. The **Arseno/Sulphide** zone was the only prospect drilled with the best intersection containing 5.07 grams per tonne gold over 2.2 metres. Kestrel Resources Ltd. drilled two holes to test a geophysical anomaly on the nearby **B1-North** property. No significant mineralization was encountered.

Newmont Lake Area

The Northwest zone of the **McLymont** property was drilled extensively by Gulf International Minerals Ltd. It is now believed to be a gold-enriched retrograde-altered skarn. Jasper, hematite, carbonate, quartz and rare remnants of andradite garnet with associated gold have replaced units of coarse crinoidal marble. Galena-lead isotope analyses indicate an Early Jurassic, or older age. Zones with similar alteration patterns have been identified elsewhere on the property.

On the adjacent **Gab 9** claims, held by Jazzman Resources Inc., a thick succession of Mississippian volcanic, volcaniclastic and bioclastic rocks underlies the property. The exploration target is a gently dipping crinoidal limestone occurring near steeply dipping faults associated with the regional McLymont fault. Dolomitization, silicification and chlorite alteration are associated with widespread pyrite. Gold is primarily confined to silicified and sericitized zones in recrystallized limestone as seen on the adjoining McLymont property. The most significant results include an assay of 11.6 grams per tonne gold over 1 metre within a strong geochemically anomalous zone 80 metres thick.

On the **KRL** property, located near the McLymont property, Kestrel Resources Ltd. drill-tested a series of quartz veins carrying visible gold. A number of drill holes cut short sections assaying up to 34 grams per tonne gold. Northwest of the McLymont area, Ticker Tape Resources Inc., on the **Newice** property, and Adrian Resources Ltd., on the **New** claims, drilled a series of gold-bearing quartz veins. They report no significant results.

Iskut River Area

The **Rock and Roll** property of Thios Resources Ltd. is centred on some rocky knolls near the confluence of the Craig and Iskut rivers. The Black Dog zone has massive pyrite, galena, sphalerite and chalcopyrite mineralization in a subvertical shear zone. Immediately to the east, on ground controlled by the Iskut Joint Venture, gold occurs in variably carbonate-altered and sheared pyritic volcanic rocks and/or narrow quartz-carbonate veins. Drilling tested three zones in two phases. The best result was an intersection assaying 8.98 grams per tonne gold over 1.37 metres obtained from the Gregor zone.

Underground development and surface construction continued at Cominco Ltd.'s **Snip** deposit, in preparation for the commencement of mining operations in 1991 (*see* section on Development Projects). On nearby Johnny Mountain, a large exploration program was completed by Skyline Gold Corporation on the **Johnny Mountain Flats** area. High gold values were found in a 1.5-metre quartz vein at the C1 zone and in a mineralized shear zone called the Burnie. In addition Skyline worked with Placer Dome Exploration Inc. in a joint venture covering the **Reg** claims which cover the Bronson Creek and Bonanza West prospects. Polymetallic mineralization was discovered in a shear zone (the Bonanza zone) which lies along the extension of the structural zone hosting the Snip deposit.

Big M Resources Ltd. worked on the **Waratah** property, located just east of the confluence of the Iskut River and Bronson Creek. The program consisted of surface trenching and drilling on the Cooper occurrence, a gold-bearing shear zone.

To the south, on the **Inel** property, Gulf International Minerals Ltd. completed an underground development and drilling program on the AK zone, in conjunction with Avondale Resources Inc. The pyrite, sphalerite, galena, chalcopyrite and arsenopyrite mineralization is hosted by a syenitic intrusive breccia. The mineralized breccia was traced over a strike length of about 150 metres. Two of the best drill-hole intersections were 7.4 metres grading 41.14 grams per tonne gold and 9.2 metres grading 18.17 grams per tonne gold. The highest gold values seem to be concentrated along one horizon at about the 1690-metre elevation.

On the nearby **Stu** property, Kestrel Resources Ltd. drilled high-grade veins in two separate areas. To the east, on the adjoining **Cam** claims of Crimsonstar Resources Ltd. and Florin Resources Inc., pyrite, pyrrhotite, chalcopyrite and arsenopyrite, with magnetite and hematite, were intersected in drilling on a strong geochemical anomaly. The mineralization may be similar to skarns found on the adjacent **Josh** claims.

The **Gossan** claims in the Khyber Pass area, south of Inel, are underlain by sediments and volcanics of the Lower Jurassic Betty Creek and Unuk River formations. These units have been intruded by megacrystic feldspar-porphyritic diorite and an equigranular monzonite. Vector Industries International Inc. drill-tested the Pyramid Hill skarn, Zinc Hill and 'A' zones. The A zone, first drilled in 1985, is interpreted to be a conformable horizon

Plate 2-5. Exploration in rugged northwestern British Columbia continued at a record pace in 1988. On the Eskay Creek property more than $25 million dollars was spent on this rich gold-silver deposit which is accessible only by helicopter.

at the base of an andesitic unit and overlying a siltstone. The **Zinc Hill** zone is located northeast of the A zone and has a similar style of mineralization. A 54.4 metre intersection on the A zone returned values of 1.10 grams gold and 10.29 grams per tonne silver, 0.05 per cent copper and 0.42 per cent zinc.

A 1988 airborne magnetometer survey over the **Nickel Mountain** property of Silver Standard Resources Inc. was followed up late in 1988 by a short drilling program testing two pronounced anomalies. Swift Minerals Ltd. drilled five holes on the nearby **Coulter Creek** property.

Eskay Creek Area

Exploration continued at full bore on the **Eskay Creek** property with expenditures in excess of $25 million, the biggest program in British Columbia in 1988. Work was concentrated on infill drilling on the 21B zone, previously known as the Central zone, and its strike extension to the north. A step-out drilling program tested mineralization discovered on the 'C' and Pump zones to the west and east of the 21B zone, respectively. During the second half of the year an underground program included 1000 metres of drifting, and two crosscuts in ore, providing a bulk sample for metallurgical testing. The project entered the Mine Development Review Process with submission of a Prospectus in April. During 1988 Road access and environmental studies were undertaken for a Stage I report which is scheduled to be submitted in the spring of 1989.

Current estimated tonnages for the 21B and parts of the 21C and Pumphouse Lake zones, using a 3.42 grams per tonne gold cut off, are a geological reserve of 3.967 million tonnes grading 26.4 grams per tonne gold and 998.4 grams per tonne silver plus significant zinc and lead values. The deposits are hosted by argillaceous sedimentary rocks within the lowest member of the Salmon River Formation and partly within a footwall sequence of rhyolites of the Mount Dilworth Formation. The 21B zone is now recognized to be a volcanogenic massive sulphide deposit.

Drilling by Adrian Resources Ltd. further defined reserves on the **Tok** claim "gap" which is surrounded by the Eskay Creek property. These reserves are part of the 21B deposit but are reported separately as 153,314 tonnes grading 22.63 grams gold and 598.98 grams silver per tonne at a 3.42 grams gold cut off. Adrian Resources also drilled on its **Ski** property to the north and east of the Eskay Creek project. Lower grade mineralization was traced along strike from the 21B zone for several hundred metres onto this property. The zone is deeper toward the northeast.

On the **GNC** claims, which are located to the east and west of the Eskay Creek property, Prime Resources Group Inc. focused its drilling on the Tip Top and Porphyry showings. The latter is a base metal zone with gold

and silver values, adjacent to a feldspar porphyry intrusion. Adjoining the GNC property to the west, the **Lakewater** holdings of Tymar Resources Inc. were also drilled for possible down-dip extensions of the Eskay Creek deposit.

The **Albino Lake** project of Eurus Resources Corp. abuts the Eskay Creek property on the northwest. A winter drilling program is testing for the down-dip extensions of the 21C and 21B zones. The **Sib** property of American Fibre Corporation adjoins the Eskay property to the southwest. Intensely altered volcanic rocks host stockwork and vein-breccia mineralization within the 4.2-kilometre-long gossanous Central anomalous zone. Drilling cut numerous intercepts of 0.34 to 3.09 grams per tonne gold . Two hundred and fifty metres west of the Central zone and five kilometres south of the Eskay Creek property, an intersection in the Lulu zone averaged 14.43 grams gold and 1059.85 grams silver per tonne over 14.3 metres. The mineralization is in a graphitic mudstone interbedded with felsic volcanics.

Sulphurets Creek Area

Granges Inc. worked its large Unuk River property south of the Eskay Creek area which covers a number of prospects. Exploration focused on the **R grid**, **Zone 1/AP zone**, **U2 grid** and **Beedee zone**. Thirteen holes were completed on Zone 1 and three holes on the R grid. Short, subeconomic, polymetallic mineralized intervals were encountered in brecciated welded tuffs in the Zone 1/AP zone. No significant mineralization was encountered in R-grid drill holes which intersected minor felsic tuffs in a dominantly argillitic and andesitic sequence.

In the Sulphurets Creek area, drilling on the **Nica** claims by Ambergate Explorations Inc. produced little encouragement. Exploration on the nearby **Sul** claims by Kenrich Mining Corporation also did not find any significant showings.

On the **Kerr** property, more than 17 000 metres of drilling was done, on a porphyry target, by Placer Dome Exploration Inc. Mineralization and alteration occurs in Triassic volcanics and sediments intruded by subvolcanic alkaline intrusives. Disseminations and veinlets of chalcopyrite with lesser chalcocite, tenantite and bornite occur in a shear zone 90 to 100 metres wide within a north-trending sericitic alteration zone. Average grades of 0.8 per cent copper and 0.034 gram per tonne gold have been traced for a strike length of 1 kilometre and to a depth of 400 metres. Reserves based on 1989 information are quoted as 114.3 million tonnes grading 0.61 per cent copper, 0.27 gram gold and 1.71 grams silver per tonne.

Immediately to the east, on the **Sulphurets** property, Newhawk Gold Mines Ltd. completed underground drilling during the winter which extended the R8 vein system to the south and at depth, and the West zone deeper and to the north.

Stewart Mining Camp

Teuton Resources Ltd. discovered a 600 by 200-metre gold anomaly in soils on the 4Js property, 50 kilometres north of Stewart. Drilling beneath the anomaly intersected mineralization containing from 2.37 grams gold per tonne over 7.2 metres to 7.82 grams gold per tonne over 1 metre. At **Tide Lake**, Tenajon Resources Ltd. trenched and drilled the 73-metre-long 'A' structure. Surface chip samples averaged 20.5 grams gold and 6.86 grams silver per tonne over a width of 1.16 metres.

At the **Summit** property, the former Scottie Gold mine, Royal Scot Resources Ltd. conducted a surface and underground program testing the E, C and M zones. Continuity of the M zone was confirmed below the 3000 level.

A zone of vein-breccia replacement zone with polymetallic sulphides, 600 metres long, occurs on the **Silver Crown** property of Nararre Resource Corporation. The mineralization is hosted by what are believed to be mid-Jurassic siltstones and greywackes overlying well-stratified epiclastics of the Mount Dillworth felsic volcanic sequence.

Tenajon Resources Ltd. completed a drilling program which extended and confirmed the continuity of the Kansas and West Kansas zones on the **Silver Butte** property. Sulphide mineralization occurs in a quartz-carbonate stockwork hosted by Hazelton Group andesites. In October, Tenajon Resources and Westmin Mining Limited signed a joint venture agreement on the property, which is situated a kilometre southwest of the **Big Missouri mine** site. Milling the high-grade ore from the Silver Butte is expected to improve the overall economics of the **Premier Gold mine** operation. Westmin is currently evaluating drill data on the Facecut and West Kansas zones provided by a drilling program completed in September and October. Data from drilling on the **Dauntless** claim, adjacent to the Silver Butte, are also being evaluated.

Westmin continued to explore for new ore reserves. On the **Silbak Premier** deposit, the 4G area of the 4 level was rehabilitated and an extensive underground drilling program undertaken. Westmin also drilled the **Indian** and **High Ore** properties.

In the Mount Shorty Stevenson area, Armeno Resources Inc. drilled north and south of the workings on the main structure of the **Independence** property. To the north, the silver mineralization was tested at depth and along strike. Testing to the south was for gold mineralization at depth.

On the **Ice** claims the target is a brecciated vein with quartz and sulphides, hosted by Lower Jurassic Unuk River Formation volcaniclastics and intercalated tuffaceous sandstones. Core from 50 centimetres of one hole assayed 1.79 grams gold and 343.0 grams silver per tonne, and 9.24 per cent zinc.

In the Todd Creek drainage, Noranda Exploration Company, Limited drilled coincident induced polarization and geochemical anomalies on the **Fall Creek** zone. The zone is a hydrothermally altered and mineralized area within a felsic volcanic and volcaniclastic package believed to be part of the Mount Dillworth Formation. On the **Moonlight** property, a few kilometres to the west, High Frontier Resources Ltd. drilled a quartz vein within a mineralized zone at the contact of volcanic and sedimentary rocks of what is believed to be the Lower Jurassic Unuk River Formation.

Approximately 15 kilometres east of Stewart, Teuton Resources Corporation evaluated a series of base and precious metal zones characterized by metal-rich veins and gold-copper-rich replacement horizons. The hostrocks are thought to be Middle Jurassic volcaniclastic and epiclastic rocks of the Betty Creek Formation which are flanked on either side by Salmon River Formation sedimentary rocks. Both units are intruded by a plagioclase hornblende porphyry. The mineralization appears to occur at the sediment-volcanic contact.

Bond Gold Canada Inc. drilled near **Red Mountain**. Although little information is available about this property, preliminary data suggest that this is a mesothermal vein system, possibly related to a porphyry system. Approximately 25 kilometres south of Stewart, Bond Gold Canada also undertook a program on the **Georgia River** property.

Alice Arm Area

At the head of the Kitsault valley, Oliver Gold Corporation conducted a large geophysical and geochemical program on the **Kits-Jade** property. The focus of exploration has moved from narrow, high-grade lead-silver shear veins to large-tonnage, stratiform zinc-lead-silver targets. Broad zones of porphyry copper-gold mineralization have also been outlined.

Dolly Varden Minerals Inc. drilled for massive sulphides in a wide area of conformable barite mineralization. The sporadic zinc-copper-lead-gold values encountered are interpreted by Dolly Varden Minerals geologists as a distal facies of a sulphide lens.

North Coast

Cominco Ltd. drilled the **Packsack** property in the Ecstall River area to test continuity of the known massive sulphide horizon at depth.

The limestone quarry on **Aristazabal Island**, owned by Laredo Limestone Ltd., was drilled to confirm reserves and limestone quality.

Todoggone River Area

Gold-silver epithermal veins hosted by Triassic Takla Group and Lower Jurassic Toodoggone volcanics (equivalent to the Hazelton Group) have remained the focus of exploration in the area. On the southeastern border of the camp porphyry copper-gold mineralization is the target.

Cheni Gold Mines Inc. conducted an extensive exploration program on the **Lawyers** property. The AGB zone was drilled in the West and Blasthole segments. The deposit contains a hematite zone grading into a silicic then propylitic zone with depth. The Duke's Ridge zone was tested for a down-dip extension of the structure. The entire Cliff Creek zone was drilled. Both the South and Mid areas within the Cliff Creek zone are more complicated than originally thought. The mineralization is associated with narrow breccia zones which seem to act as conduits for ore-forming fluids. The veins appear to be tension gashes between the breccia zones.

On the **Shasta** property, mineralization is hosted predominantly by feldspar quartz crystal-lapilli tuffs informally named the "pyroclastic series" of the Toodoggone Formation. Volcaniclastics overlying the pyroclastic series appear to postdate the mineralization. The mineralization can be characterized as tabular to curviplanar quartz-calcite breccia zones within an area of variable alteration and stockwork veining. Drilling results on the Creek zone were encouraging for Homestake Minerals Ltd.; it was extended along strike and now has a 1000-metre length, 200-metre down-dip extent and an average thickness of 6 metres.

South of the Toodoggone and east of Thutade Lake, El Condor Resources Ltd. explored for porphyry copper-gold mineralization on the **North** and **South Kemess** properties.

The **North Kemess** property, east of Duncan Lake, was drilled to test the mineralization in intensely hydrothermally altered diorite plutons and Takla volcanics. These rocks host auriferous porphyry copper mineralization within phyllic and potassic alteration zones that are surrounded by extensive propylitic alteration. Drilling on the **South Kemess**, which is south of Duncan Lake, gave encouraging results ranging from 0.03 gram per tonne gold and 0.19 per cent copper over 40.6

Plate 2-6. At the Equity Silver Mine mining operations focussed on the Main Zone pit (shown above) with development and initial mining of the Waterline Zone pit. Current ore reserves at Equity Silver are projected to be exhausted by late 1992.

metres to 0.83 gram per tonne gold and 0.31 per cent copper over 161.72 metres. The host stock, a complex monzonite-diorite that is variably quartz bearing and strongly altered and quartz veined, intrudes Takla volcanics and interbedded sediments.

Babine Lake Area

Noranda Minerals Inc. carried out three exploration programs in the Babine Lake area. At the **Bell mine site**, Noranda drilled 52 holes within and adjacent to the pit in order to better define ore and waste zones. An additional 10 holes were drilled to the north and west of the pit to define areas suitable for future waste-rock dumps. For the first time in a number of years, Noranda Minerals worked on the **Granisle property**. Drilling was to confirm the grade and tonnage calculations determined from drill and blasthole data which collected prior to the closure of the Granisle mine, and also to define waste zones within the core of the deposit. A few holes tested the possibility of pushing back the north wall of the pit. On the **Hearne Hill** property, drilling by Noranda for the last two years has been targeted on an altered, chalcopyrite-bearing breccia pipe within a Tertiary biotite feldspar porphyry. Part of a larger zone of low-grade fracture controlled mineralization, the pipe extends to 450 metres below surface where it is cut off by a postmineral quartz feldspar porphyry dike.

Smithers - Houston Area

Drilling on the **Dome Mountain** property of Teeshin Resources Ltd., 25 kilometres east of Smithers, outlined a continuation of the main ore zone and increased the length of the Boulder shear zone. Significant intersections were encountered throughout the 350-metre extension of the Boulder zone. In November, Teeshin Resources announced the signing of a joint venture agreement with Timmins Nickel Inc. whereby the latter company is to bring the property into production.

North of Houston, copper showings on the **Grouse Mountain** property were drilled by Swift Minerals Ltd.

Equity Silver Mines Ltd. explored both at the mine site south of Houston and on a number of properties within the region. At the mine site, drilling the down-dip extension of the southern end of the Main zone, intersected several narrow intervals of erratic high-grade copper-silver-gold mineralization. Ten kilometres south of Houston, Equity Silver drilled an alteration zone on the northeast side of **Bob Creek**. Four holes intersected strongly clay-altered zones with weak mineralization averaging 0.3 gram per tonne gold with assays sporadically reaching 2.9 grams per tonne gold. The Eric copper-silver showing in a Lower Jurassic Hazelton Group lapilli tuff was the drill target of another Equity Silver program south of Houston. The stratabound mineralization consists of pyrite, tetrahedrite, galena and traces of chalcopyrite and sphalerite within the tuff.

On the **Parrott Lakes** project, south of Houston, Territorial Drilling Ltd. drill tested a zone of zinc-silver mineralization.

On the northeast side of Ootsa Lake, Mingold Resources Inc. intersected several epithermal zones of intense silicification and brecciation in drilling on the **Rhub-Barb** property. The host rocks are Lower Tertiary Ootsa Lake Group volcanics. Assay values are up to 1.371 grams per tonne gold over 0.70 metre.

In the Burnie Lakes area Equity Silver Mines Ltd. drilled several copper silver gold showings on the Lefty Property which are hosted hosted in rhyolite flows and andesites of the Lower Jurassic Hazelton Group. The mineralization consists of disseminations of chalcopyrite, tetrahedrite and sphalerite.

Eighty kilometres southwest of Houston, Mark Resources Corporation conducted follow-up drilling on two mineralized areas on the New Moon property.

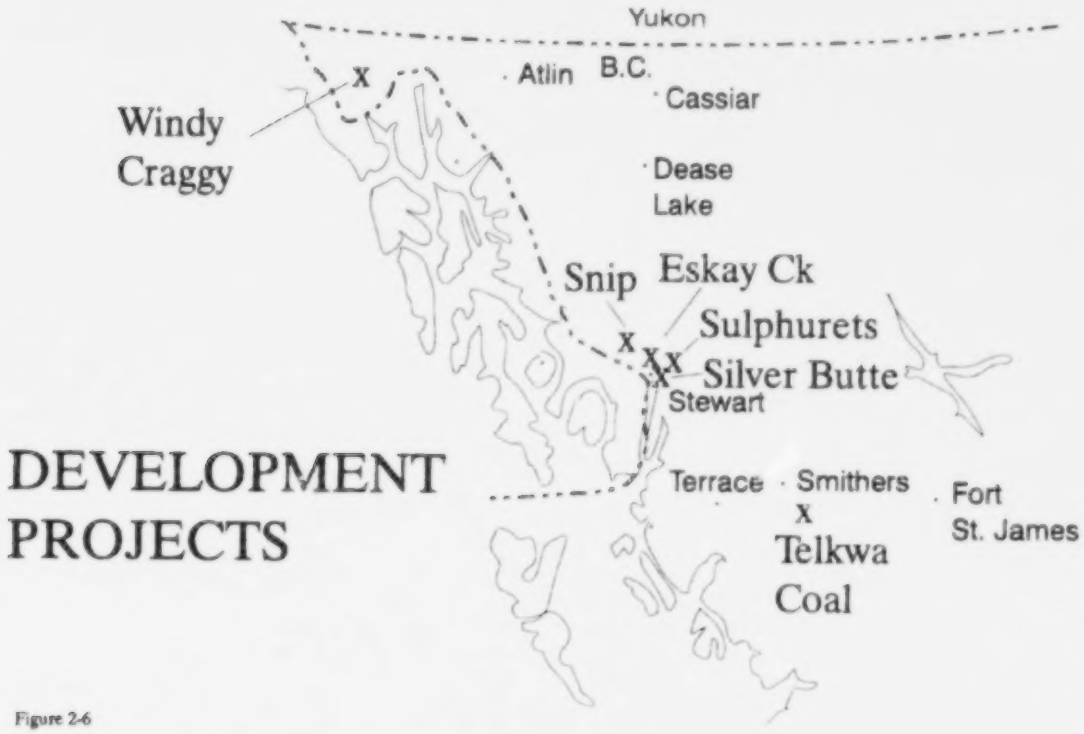


Figure 2-6

Silicification and shearing at, or close to, the contact between rhyolite and andesite flows returned values up to 12.89 grams per tonne gold across 2 metres. The Main zone of stringer to semimassive base and precious metals mineralization was also tested.

Whitesail Lake Area

Although there are a number of known porphyry deposits in the Whitesail region, major exploration activity in the area has been limited for the past several years. Golden Knight Resources Inc. completed the last half of a $1 million program to assess the potential of the old **Deer Horn mine** situated within the Tweedsmuir Recreation Area.

COAL

The **Telkwa** property of Crows Nest Resources Limited was the only active coal project in the Northwestern District in 1990. Crows Nest submitted a revised Stage 2 report early in the year. The mine plan focuses on the bituminous coal deposits on the north side of the Telkwa River in the vicinity of Pine Creek. Plans were outlined to develop the deposits near Goathorn Creek on the south side of the Telkwa River towards the end of the life of the mine. In December, the company announced plans to phase out its coal operations and closed its office in Smithers.

PLACER

Placer activity decreased 20 per cent from the preceeding year, to 59 Notices of Work for the Northwestern District. Thirty-three of the notices were from the **Atlin** Mining Division, including 26 from the Atlin placer camp. The busiest area was **Spruce Creek** with six operations. In the Liard Mining Division there were 29 placer Notices of Work filed with three operators on each of **Dease**, **McDame** and **Rosella** creeks.

DEVELOPMENT PROJECTS

A number of projects were in the provincial government's **Mine Development Review Process** at the end of 1990. Active projects were Eskay Creek, Silver Butte, Snip, Sulphurets, Telkwa Coal and Windy Craggy (*see* Figure 2-6, Table 2-3). The Snip deposit was the only project for which the company had announced a production decision. Telkwa Coal has already been discussed in the section dealing with coal.

TABLE 2-3
ACTIVE MINES IN THE NORTHWEST DISTRICT, 1990

PROPERTY NAME (OWNER)	TONNES MILLED (000's)	RATED CAPACITY (TPD)	%ANNUAL RATED CAPACITY	DEPOSIT TYPE	RESERVES/PRODUCTION
Golden Bear (Golden Bear Op. Co.)	61.2	360	50	Vein Au	488 706 grams Au; for period Jan. to Nov.
Cassiar Mine (Cassiar Min. Corp.)	960	3600	91	Ultramafic asbestos	Mined out in June 1990, produced 2 603 692 tonnes of asbestos fibre from 1953 to 1990. Underground mining started on the McDame deposit in November.
Johnny Mountain (Skyline Gold Corp.)	96.9	350	92	Mesothermal vein Au-Ag-Cu	Suspended operations in August; 1 188 079 grams grams Au, 1 699 118 grams Ag, 271.5 tonnes Cu; for for period Jan. to Aug.
Premier Gold (Westmin Mines Ltd.)	620.5	2000	100	Epithermal vein Au-Ag	1284 kg Au, 14 825 kg Ag; for period Jan. to Oct.
Lawyers (Cheni Gold Mines Ltd.)	175.3	500	100	Epithermal vein Au-Ag	1488 kg Au, 33 455 kg Ag for period Jan. to Nov.
Shasta (Sable Resources Ltd.)	53.6	181	89	Epithermal vein Au-Ag	237 kg Au, 11 784 kg Ag for period Jan.-Nov.
Bell Mine (Noranda Minerals Inc.)	4957	14402	93	Porphyry Cu-Au	825 kg Au, 2989 kg Ag 43 537 747 lbs Cu
Equity Silver (Equity Silver Mines Ltd.)	2621.6	9000	96	Transitional Ag-Au-Cu	200 530 kg Ag, 1797 kg Au 5 293 200 kg Cu for period Jan. to Oct.

The **Snip** gold mine of Cominco Ltd. was under construction in late 1990 with startup planned for early 1991. The government Approval-in-Principle was granted in January 1990. Onsite construction started in June, although several buildings had been completed the previous year. The work included driving a 1-kilometre haulage adit at the 130 level and preparing the tailings impoundment area. A refitted 300 tonne per day mill was barged to the site. The mill will recover gold and silver metals from a gravity separation circuit and in concentrate from a sulphide floatation circuit. Many supplies for the mine site have been shipped in from Wrangell by hovercraft which will carry concentrate to Wrangell on the return trips after the mine opens.

Newhawk Gold Mines Ltd. completed a winter drilling program on the **Sulphurets** property. The drilling followed the West and R8 zones along strike and deeper. Cominco Engineering Services Ltd. and Fluor Daniel Wright Engineers Ltd. both completed feasibility studies. The latter study determined that a 317 tonne per day operation would entail a capital cost of $42.7 million with estimated direct operating costs of $130 per tonne. At the current metal prices the Sulphurets project was not deemed to be economic by Fluor Daniel Wright Engineers. The project has completed Stage I of the Mine Development Review process; the next step would be Stage III.

During the summer Geddes Resources Ltd. completed a large program, costing more than $10 million, to facilitate mine planning for the Windy Craggy deposit. A major drilling program located the Ridge ore zone, a new discovery, between the North and South orebodies. Engineering, environmental and glaciology studies were completed. There were also ongoing studies to assess the acid generation potential of the waste rock. A Stage I report was submitted to the Mine Development Review Committee in January, 1990. It was followed by a revised Mine Plan for the Stage I proposal in November. Two series of open-house meetings for the general public were organized by the company to help disseminate information about the proposed mine. The meetings were held in communities in British Columbia, Alaska and the Yukon in May and November.

An extensive exploration program, costing approximately $29 million dollars, was completed on the **Eskay Creek** property by Prime Resources Group Inc.

Figure 2-7

(see description above). A prospectus was submitted to the Mine Development Review Committee in April, 1990. A variety of terrain, engineering and environmental studies were carried out during the summer to establish mill and tailings pond locations. A 10-kilometre road route, which would link the property to the proposed Iskut road, was surveyed. A takeover battle for ownership of the property ended with Corona Corporation in charge and Placer Dome Inc. the other major owner. The Mine Development Review Committee was told to expect a Stage I report in the spring of 1991.

Exploration on the **Silver Butte** property has outlined 279 400 tonnes grading 17.14 grams gold and 36.7 grams silver per tonne. In October Westmin Mines Limited entered into a joint venture with the owner Tenajon Resources Ltd. to develop the orebody to provide feed for the Premier mill.

OPERATING MINES

During 1990 the nine mines operating in the Northwestern District employed over 1450 people and played a very important economic role in northwestern communities (Figure 2-7). The base metal open-pit mines enjoyed high copper prices for a second straight year; however, the gold mines suffered soft gold and silver prices throughout 1990. The McDame underground deposit at Cassiar was the only new mine to open in northwestern British Columbia.

Cassiar Asbestos closed open-pit operations in June 1990 after operating since 1953. Ore from the pit was stockpiled for milling until the McDame underground deposit came on stream in November. The change from open-pit to underground mining has resulted in some additions to the work force. At McDame, preparations for underground production continued all year, including the relocation of the tramline. Numerous faults in the serpentinite host of the asbestos fibre produces very unstable mining conditions. Working headings in the ore zones require shotcreting round by round, which adds considerably to costs. Markets for the asbestos fibre remained strong throughout the year.

The **Golden Bear mine** experienced a number of start-up problems in 1990. An innovative mill system has required an extended tune-up period. Difficulties with the dry-grind process have been resolved, but problems with the roaster system were still being addressed late in the year. Most of the feed was lower grade oxide ore from the open pit which could bypass the roaster. The objective is to feed the mill equally from both underground and open pit operations. A stockpile from summer mining in the open pit is used during the winter months. Capital costs, initially estimated at $36 million, have now reached $82 million.

The **Johnny Mountain mine** suspended operations in September 1990 because ore reserves were depleted. Skyline Gold Corporation found that the high costs of operating a fly-in operation, coupled with the lower than predicted head grades for the mill, necessitated shutting down the operation. Annual transportation costs were estimated to be $2.4 million. The 318 tonne per day mill has produced 2333 kilograms of gold, 3826 kilograms of silver and 88 984 kilograms of copper from the Stonehouse deposit since beginning production in August 1988.

The **Premier Gold project** mined ore from the Dago, S-1, Province and Silbak Premier pits in 1990. Persistent problems with dilution of ore by lower grade rock has affected this operation's profitability. In the second quarter, tonnages were up and the average head grade had kept pace, however, third quarter production slipped. Westmin Mining Limited announced in December that due to persistent adverse technical and economic factors it had been forced to reduce the ore reserves in the Silbak Premier deposit. This will result in reducing both the mill rate from 2300 to 1500 tonnes per day, and the number on staff from 165 to 100 early in 1991. Investigation of potential new ore sources and reconfirmation of existing ore reserves are ongoing.

On the **Lawyers property** in the Toodoggone, Cheni Gold Mines Inc. carried out an aggressive exploration program on the Cliff Creek zone, continued mining the AGB zone, completed a decline on the Cliff Creek zone and built a tote road to the nearby Al property. The AGB zone is expected to be mined out in the spring of 1991. Grades on this zone have been 12 per cent higher than predicted. Underground development of the Cliff Creek zone has been ongoing in order to bring it onstream with depletion of the AGB. Due to differences in sulphide content, ore from the two zones will not be blended. Exploration on the southern extension of the Cliff Creek zone indicated that deposit was smaller than originally thought. As a result Cheni announced in September that it had reduced the Cliff Creek reserves to 755 000 tons of probable and 472 000 tonnes of possible ore.

Nearby, on the **Shasta deposit**, Sable Resources Ltd. began underground development on two levels in order to access both the JM and Creek zones. During the summer ore was trucked about 10 kilometres to the old Baker mill site where it is stockpiled to feed the mill year round. The Baker mill has been modified to run at a reduced rate of 180 tonnes per day with an average head grade of 5.14 grams per tonne gold.

On Newman peninsula in Babine Lake, Noranda Minerals Inc. maintained production at the **Bell mine** near the capacity level of 13 500 tonnes per day with an average head grade of 0.48 per cent copper. Encouraging results from 1990 exploration drilling on the southeast side of the pit are expected to extend the mine life. Drilling at the nearby Granisle pit may lead to the identification of additional reserves for the Noranda Minerals Inc. mill.

At the **Equity Silver Mine** southeast of Houston, production continued at a rate of 8600 tonnes milled per day with an average head grade of 12.10 grams per tonne silver, 1.15 grams per tonne gold and 0.29 per cent copper. Mining continued on the Main zone and, to a small extent, on the Waterline zone. Equity Silver Mines Ltd. has been actively exploring for new reserves within the region as a closure of open-pit operations is anticipated in the fall of 1992. Acid rock drainage is an ongoing problem being addressed by the company. A site-reclamation bond has been posted with the provincial government and negotiations are proceeding to determine the final amount of the bond.

CENTRAL DISTRICT

By E.L. Faulkner and B.E. Madu
District Geology, Prince George

INTRODUCTION

The number of projects in the Central District set a new record in 1990. Mineral exploration expenditures were estimated at $35 million, down from $40 million in 1989, due to greatly reduced spending by junior companies. Placer operations were down 13 per cent from 1989, due to continued increases in costs that were not offset by higher gold prices.

Alkali porphyry and porphyry-related copper-gold deposits were again the dominant exploration targets in the district, especially in the northern Quesnel trough. There was some interest in base metal targets with precious metal credits, mostly by major companies with long term interest in base metal mining. Interest in industrial minerals picked up, especially among small operators, due to the more attractive status of such properties under the Mineral Tenure Act. The Canadian Coal Co. Ltd. revived plans for production from the Sukunka deposit, otherwise there was little coal exploration outside established mining areas.

HIGHLIGHTS

- Placer Dome Inc. gained control of the Mount Milligan deposit and is fast-tracking it to production.
- The Mount Polley deposit received a positive feasibility decision.
- The QR deposit received Approval-in-Principle for production.
- Underground development resumed at the Cirque deposit.
- Canadian Coal Co. Ltd. revived plans to mine the Sukunka deposit.

TRENDS AND OPPORTUNITIES

Figure 3-1 shows the growth in interest in the Omineca Mining Division over the past few years. This is the result of success at Mount Milligan, and rapidly improving access to the area due to logging activity.

Major companies were responsible for most of the spending in this and other parts of the Central District, led by Placer Dome Inc., BP Resources Canada Ltd., Rio

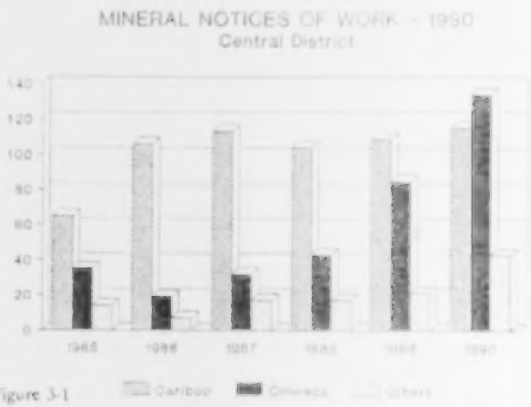


Figure 3-1

Algom Exploration Inc. Noranda Exploration Company Limited and Cominco Resources International Limited. A number of other major companies were either new to the district, or had greatly increased budgets for 1990, including: Asarco Exploration Company of Canada Ltd., Kennco Explorations (Canada) Ltd., Inco Ltd., Teck Corporation and Westmin Resources Limited. Majors are expected to dominate the exploration scene again this year, but possibly with lower budgets than in 1990. The outlook for junior company spending at other than assessment work levels is bleak.

There was modest interest in base metal targets with precious metal values, but curiously most of the interest was in the Barkerville - Cariboo Mountains area, and not in the Gataga-Muskwa ranges. There were only two major programs in this Devonian shale belt. Access to this area is improving more rapidly than is generally realized, and there is open ground with excellent exploration potential.

Increased costs again reduced the number of placer operations in 1990, and sharply increased fuel prices are likely to accelerate this trend during the coming year. Opportunities for exploiting interglacial or Tertiary channels exist in the Cariboo for experienced operators.

MINERAL EXPLORATION

Mineral Notices of Work totalled 284, up 32 per cent from 1989, again setting new records for the district (Figure 3-1). There were 20 major projects with expendi-

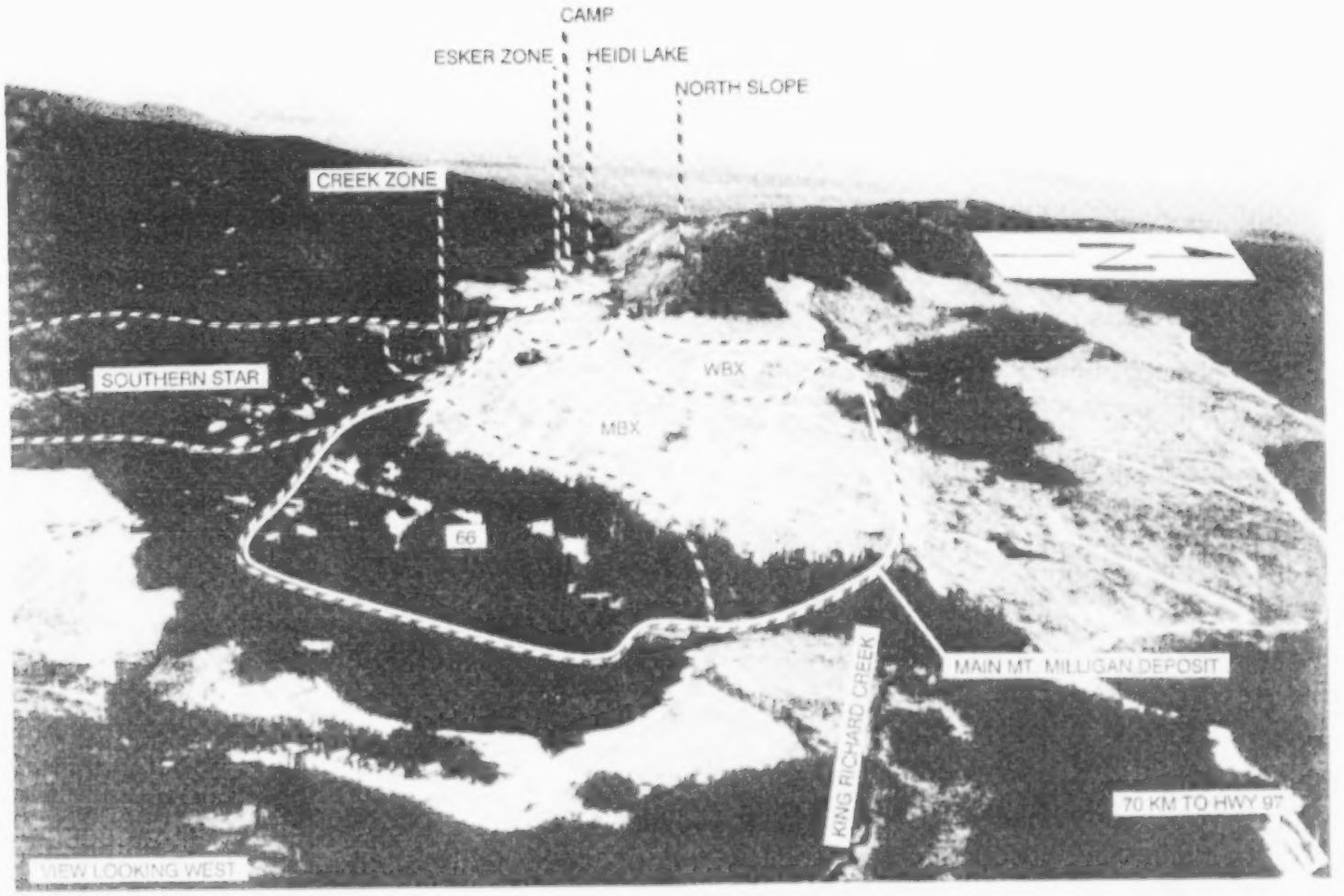

CAMP
ESKER ZONE
HEIDI LAKE
NORTH SLOPE
CREEK ZONE
SOUTHERN STAR
WBX
MBX
66
KING RICHARD CREEK
MAIN MT. MILLIGAN DEPOSIT
70 KM TO HWY 97
VIEW LOOKING WEST

Figure 3-2

TABLE 3-1
OPERATING MINES IN CENTRAL DISTRICT, 1990

MINE (OWNER)	TONNES MILLED	RATED CAPACITY (TPD)	%ANNUAL RATED CAPACITY	DEPOSIT TYPE	RESERVES/PRODUCTION
Endako (Placer Dome Inc.)	6900	29 600	63	Porphyry Mo	Reserves: 142.5 Mt @ 0.081% Mo
Gibraltar (Gibraltor Mines Ltd.)	13 245	38 100	75	Porphyry	Reserves: 183 Mt @ 0.31% Cu, 0.009% Mo Production: 27 kt Cu in concentrates and 4.5 kt cathode Cu from electrowinning plant
Blackdome (Blackdome Min. Corp.)	70.4	200	115	Epithermal	Reserves exhausted late 1990 Production: Au 1230 kg
Bullmoose (Bullmoose Op. Co.)	1800	6300	77	Coal	Reserves: 64.7 Mt Production: 1.8 Mt metallurgical coal
Quintette (Quintette Coal Ltd.)	4200	17 260	74	Coal	Reserves: 222.1 Mt. 4.45 Mt thermal coal Production: 4.7 Mt metallurgical coal

tures of $250 000 or more, up slightly from 1989. Details of major drill, surface, or underground exploration programs are given in Table 3-1, and the locations are shown on Figure 3-1.

NORTHERN QUESNEL TROUGH

Steady staking activity took place in the **Mount Milligan** area and along the eastern margin of the batholith from late 1989 to the summer of 1990. Many properties that received their first examination in 1988 or 1989 progressed to the drilling stage in 1990, and encouraging results were reported from several properties, particularly along the south and east margins of the Hogem batholith. Mapping by J.L. Nelson and K. Bellefontaine of the British Columbia Geological Survey Branch in the Mount Milligan area has identified a number of previously unrecorded plutons with geological settings similar to the intrusions at Mount Milligan, and hence the possibility for other copper-gold deposits. Work by D. Kerr, also of the Geological Survey Branch, at Mount Milligan showed the potential value of surficial geological studies in interpreting soil geochemical results in areas of extensive overburden which is common to much of the northern Quesnel trough.

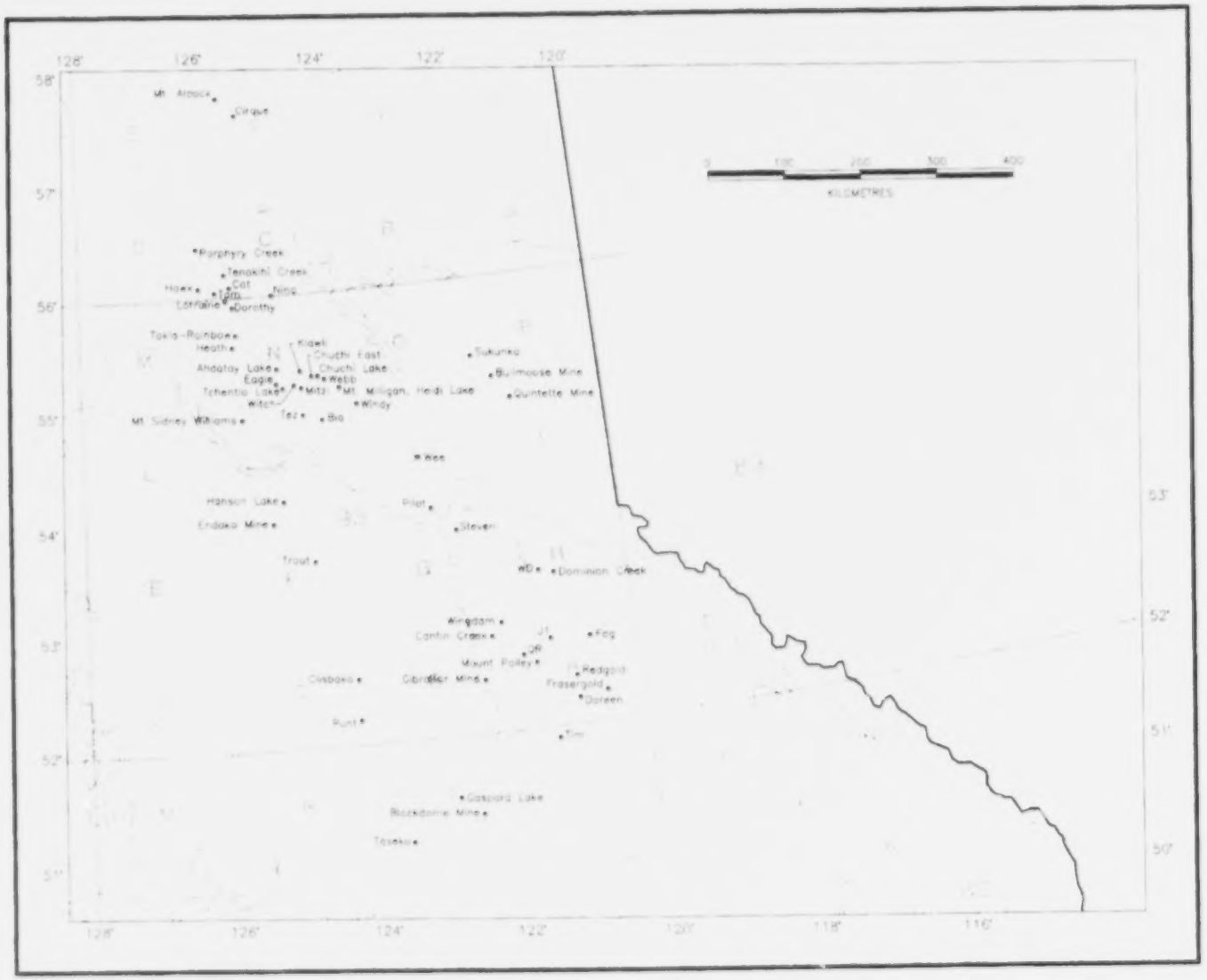
The question of which major company would gain control of the Mount Milligan deposit Figure 3-2, was settled when Placer Dome Inc. purchased BP Resources Canada Ltd.'s 30 per cent interest, and made a successful offer to shareholders of Continental Gold Corp. for the remaining interest. The total acquisition cost was close to $260 million. More than 380 holes totalling 86 000 metres were drilled by Continental Gold and Placer Dome to delimit the **Mount Milligan** and **Southern Star** orebodies and provide information for the feasibility study. Placer Dome intends to fast-track the property to a feasibility decision and, if favourable, construction is planned for late this year. Ore reserves are currently 400 million tonnes grading 0.2 per cent copper and 0.48 gram per tonne gold. Ore of higher grade in both deposits appears suitable for a starter pit.

Near Mount Milligan, drilling programs were conducted on the **Webb** property by Moondust Ventures Inc., on the **Heidi Lake** property by BP Resources Canada Ltd., and on the **Mitzi** property by Noranda Exploration Company Ltd. All reported mixed to encouraging results.

South of Mount Milligan, Placer Dome continued exploration of the **Windy** property and reported mixed results. Patchy gold and copper mineralization continue to be found in strongly sheared and altered volcanic rocks.

A large number of companies were active on alkali-porphyry targets along the eastern margin of the Hogem batholith. In the Witch Lake - Chuchi Lake area, companies typically reported encouraging results, with widespread coincident magnetic and soil geochemical anomalies, often with altered and sometimes mineralized volcanic and intrusive float in areas of generally heavy drift cover.

BP Resources Canada Ltd. was active on several properties, including **Ahdatay Lake**, **Chuchi East**, and **Chuchi Lake**. At Chuchi Lake, porphyry copper-gold mineralization of variable grade is associated with magnetite in a monzonite porphyry. Typical grades of 0.2 to 0.3 per cent copper and 0.2 to 0.4 gram per tonne gold were reported in intersections from 10 to more than 200 metres. Rio Algom Exploration Inc. reported mixed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Cirque
Porphyry Creek
Tenakihi Creek
Cat
Nina
Haex
Lorraine
Dorothy
Takla-Rainbow
Heath
Kiwi
Chuchi East
Chuchi Lake
Webb
Tukuneka
Bullmoose Mine
Quintette Mine
Ahbatay Lake
Eagle
Tchentlo Lake
Mitzi
Mt. Milligan
Heidi Lake
Windy
Wicko
Mt. Sidney Williams
Tez
Bia
Wee
Hanson Lake
Endako Mine
Pilot
Steven
Trout
Dominion Creek
Kingdom
Cantin Creek
Fog
Mount Polley
Redgold
Frasergold
Doreen
Gibraltar Mine
Cinsbako
Runt
Tim
Gaspard Lake
Blackdome Mine
Taseko
KILOMETRES
0
100
200
300
400

Figure 3-3

results from initial drilling of heavily altered volcanics on the nearby **Klawli** property and identified a number of drill targets on the **Witch** property. In this same area, Noranda prepared access to the **Eagle** property for drilling in 1991. Other companies reporting encouraging results were Westmin on the **Tchentlo Lake** and Teck Corp. on the **Heath** properties.

Farther north along the eastern margin of the Hogem batholith, where exposures are generally better, many of the properties examined were old porphyry targets. Kennco rehabilitated access to the **Lorraine** deposit and nearby **Dorothy** property, and commenced surface work to re-evaluate the potential of this area. Eastfield Resources Ltd. drilled targets on the **Takla-Rainbow** property with some good intersections of low-grade copper mineralization and spotty gold values occurring mostly in a border phase of the batholith.

At the northern end of the Hogem batholith, B.P. Resources Canada continued drilling and surface work on the **Cat** property where a number of syenite and monzonite bodies intrude volcaniclastic rocks in north-trending fault slices. Some good copper-gold mineralization was outlined in one of these on the south face of Cat Mountain, and a number of other promising target areas have been identified. A Major General Resources - Varitech Resources Ltd. joint venture found several coincident induced polarization and soil geochemical anomalies with outcropping mineralization at the **Tam** property and plan to drill three of them. Teck Corporation was also encouraged by surface work on its claims in the **Porphyry Creek** area, and Cyprus Gold (Canada) Ltd. reported erratic but encouraging copper and gold values in shear zones and stockwork veins from drilling on the **Hawk** property.

Southern Quesnel Trough

Activity in the southern Quesnel trough was again confined to established properties or old target areas. Placer Dome continued work on the **Cantin Creek property**. The geological setting is similar to the nearby **QR** deposit but the alteration is more extensive and more drilling is planned. Phelps Dodge Corporation of Canada Ltd. has outlined a large porphyry target in surface work and initial drilling at the **Redgold** property (42). Gibraltar Mines Ltd. drilled the **Doreen** property (44) with disappointing results. Despite promising surface indications, copper mineralization at depth was confined to narrow intersections.

In the Canim Lake area, Liberty Gold Corporation found widespread, fine-grained, native copper and cuprite with erratic and occasionally high silver values in altered tuffs on the **Tim** property (46). The property is on the flanks of the Timothy Mountain stock where a number of porphyry-style prospects occur.

Eureka Resources Inc. continued work on the **Frasergold** property (43) where gold is associated with secondary quartz veining in basal phyllites of the Quesnel trough. Lateral extensions of the areas of known mineralization, as indicated by soil geochemical anomalies, were generally confirmed in a $1.4 million program of stepout and infill drilling, with several reported intersections of 10 to 20 metres grading 2 grams per tonne gold or better. New bulk samples from the adit confirmed grades of 2.3 grams per tonne gold reported from earlier bulk sampling. Another major drilling program is planned for 1991.

Barkerville-Cariboo Mountains

Work was concentrated in the Cariboo Lake area, where replacement base metal and silver mineralization occurs in limestones and marbles of the Cunningham Formation at the contact with phyllites of the overlying Isaac Formation. Drilling by Cominco on the **WD** property and drilling and trenching by Teck on the **Fog** property suggests that a considerable part of this contact may be mineralized. However, the lateral continuity of this style of mineralization, in the area tested to date, has been erratic.

Fraser Plateau

Epithermal gold-silver targets in altered Ootsa Lake Group basalts on the Fraser Plateau were explored by a few companies in 1990, with mostly mixed to poor results. Goldrite Mining Corporation reported generally poor results from drilling the **Trout** property. Goldsmith Minerals Ltd. reported mixed results from the **Gaspard Lake** area where some good grade but very shallow gold-bearing quartz veins had been found in 1989. Only Eighty-Eight Resources Ltd. reported encouraging results and these were from a trenching program on the **Clisbako** property.

Other Areas

In the Muskwa Devonian shale belt, only two companies were active with major programs. Curragh Resources Inc. resumed underground exploration, drilling, and bulk sampling at the **Cirque** property with a feasibility decision expected this year. At the nearby **Mt. Alcock** property, drilling and surface work by Triumph Resources Ltd. showed that the mineralization continues

down dip rather than along strike, and deeper drilling is planned.

On the large **Hanson Lake** property Cazador Explorations Limited, continued to outline promising target areas despite delays in financing. Porphyry copper-gold mineralization, often with significant base metal sulphides, occurs in several zones.

Westpine Metals Ltd. drilled more than 11 000 metres at the **Taseko** property where copper-gold mineralization occurs in zones of intense advanced argillic alteration in Kingsvale volcanics at the contact with the Coast Range batholith. Grades of more than 1 per cent copper and 1 gram per tonne gold have been reported in several good but deep intersections in mixed quartz and quartz-andalusite zones.

PLACER

Placer Notices of Work totalled 358, down 13 per cent from 1989. Most of the decrease occurred in mechanized operations, and the number of hand operations now exceeds mechanized operations in the Cariboo. As stated earlier, significantly higher fuel prices are expected to reduce the number of mechanized operations again this year, and historic increases in placer operations associated with down-turns in the economy may not be realized.

Of note in new placer operations this year, Gold Ridge Resources Inc. began a decline in bedrock to reach the rich, buried, Tertiary gravels of Lightning Creek at **Wingdam**. Two previous underground operations at this site recovered gravels grading up to 4 ounces of gold per yard before severe water problems and inflow of mud forced their closure.

COAL

There was little exploration for coal beyond the established operating areas in 1990. Quintette Coal Ltd. continued detailed exploration in the **Mesa** and **Wolverine valley** areas with more than 20 000 metres of rotary and diamond drilling. Canadian Coal Company Ltd. reactivated production plans for the **Sukunka deposit** where reserves of 103 million tonnes of low-ash coal have been defined. A dispute over the ownership of the coal rights remains to be settled, and this could delay production plans.

MINE DEVELOPMENT REVIEW

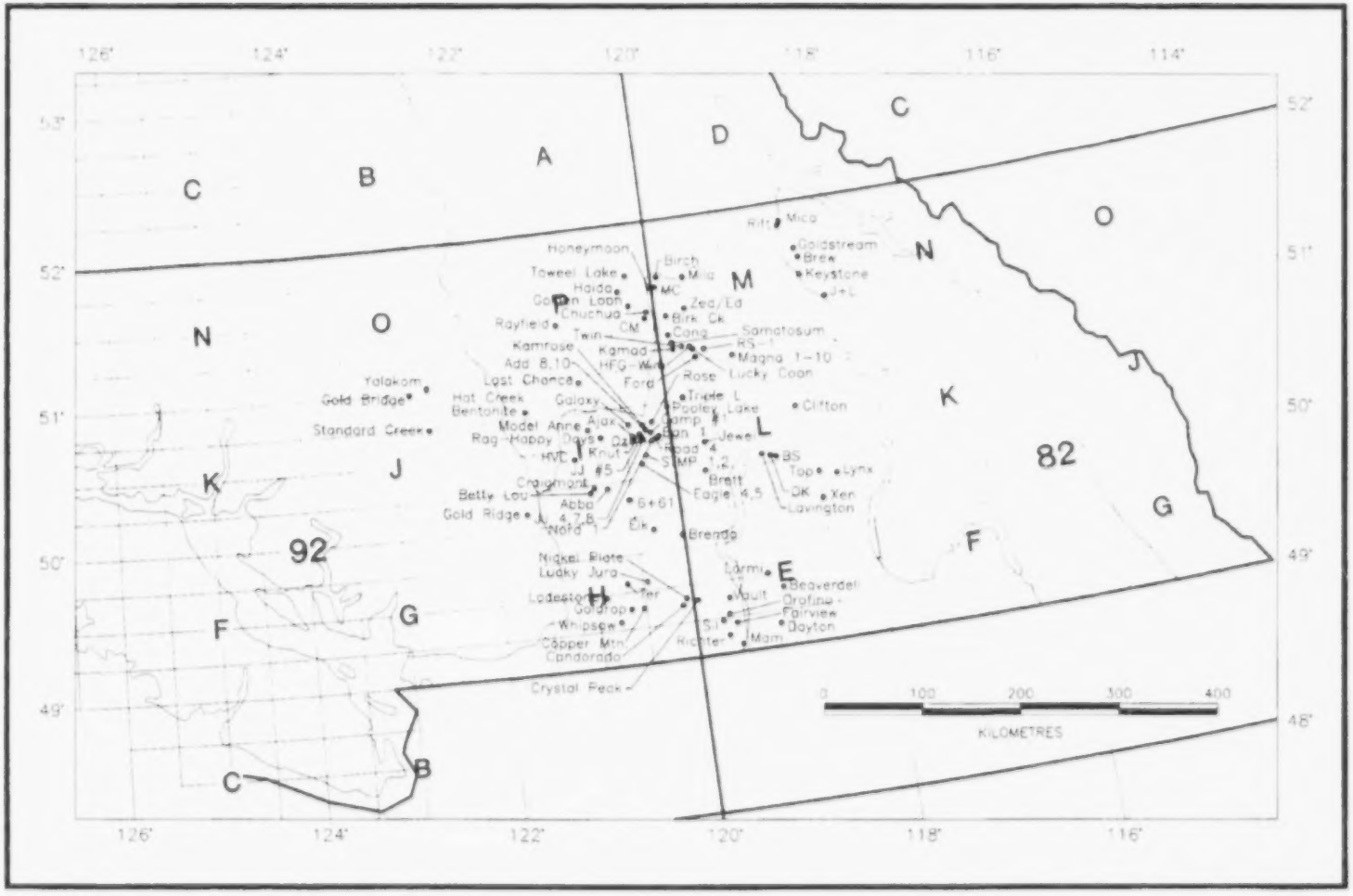
Details of projects in the Mine Development Review process are given Table 1-2.

The **QR** property received Approval-in-Principle for construction, but financing arrangements had not been decided by the end of the year. Imperial Metals Corporation submitted a Stage I report for the **Mount Polley** property, with Approval-in-Principle expected early 1991. Curragh Resources, as indicated earlier, resumed work on the **Cirque** deposit after being inactive for much of the year. Two new projects entered the Mine Development process; Continental Gold Corp. submitted a Prospectus for the **Mount Milligan** deposit, and Canadian Coal Co. submitted a revised prospectus for the **Sukunka** deposit.

OPERATING MINES

Details of operating mines in the Central District are given in Table 3-1. Output of coal from **Bullmoose mine** and **Quintette mine** was not significantly affected by a rail strike late in 1990, however, Quintette had not managed to restructure its debt financing at the time of writing.

Endako Mine continued to refine its ultimate pit design and **Gibraltar mine**, as a consequence of continued firm copper prices, revised its ore reserves upward. Ore reserves at **Blackdome mine** were exhausted late in the year and the mill closed. The potential for discovering new reserves, however, remains good and the company hopes to continue with an exploration program.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Towee Lake
Haida
Golden Loon
Chuchua
Rayfield
Twin
Kamrose
Add 8,10
Lost Chance
Yalakom
Gold Bridge
Hat Creek
Bentonite
Standard Creek
Model Anne
Rag
Happy Days
Galaxy
Ajax
Knut
JJ
#5
Craigmont
Betty Lou
Abba
Gold Ridge
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Nord
Nickel Plate
Lucky Jura
Lodestone
Goldrop
Whipsaw
Copper Mtn
Condorado
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Rose
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Camp
Jewel
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SMP 1,2
Brett
Eagle 4,5
Elk
Brenda
Larmi
Vault
Richter
Mam
Beaverdell
Orofino
Fairview
Dayton
Lucky Coon
Samatosum
RS
Magna 1-10
Clifton
BS
Top
Lynx
DK
Xen
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Keystone
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KILOMETRES

Figure 4-1

SOUTH CENTRAL DISTRICT

R.E. Meyers and T.B. Hubner
District Geology, Kamloops

INTRODUCTION

Exploration in south-central British Columbia continued at lower than usual levels during 1990. The competition for exploration dollars has been high, particularly for junior company projects. Weak gold prices and a scarcity of project funding severely hampered many projects that were very active in the 1987-89 period. Announcements of mine closures at Brenda and Beaverdell, and diminishing reserves at other operations added to an already subdued economic outlook in the exploration and mining industry in the southern Interior.

Fortunately, a contrastingly strong base metal market has partially off-set the slump in precious metals oriented junior company activity. As a result, exploration and development at operating mines has had the effect of counteracting the negative trends in the region and has contributed to maintaining a stable and secure production environment for the established base metal producers.

Total estimated exploration and development expenditures in the district for 1990 dropped to about $36.5 million, from some $70 million spent in 1989 (Table 4-1). Approximately 49 per cent of the total, amounting to $18.01 million, was spent on exploration projects (Figure 4-2). This figure includes nearly $4.4 million (or 24 per cent) devoted to exploration around active mining operations. Compared to the estimated $20 million spent in 1989, a 7.5 per cent drop in exploration funding in south-central B.C. is indicated for 1990.

Mine development expenditures in the district (Table 4-2) were also substantially lower for 1990, totalling $18.5

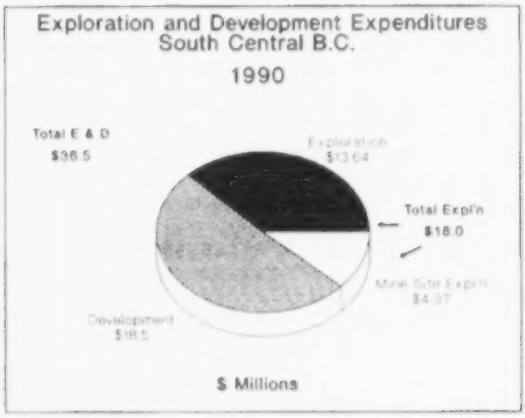

Figure 4-2

TABLE 4-1
SUMMARY OF EXPLORATION & DEVELOPMENT EXPENDITURES

	($Millions)	
	1990	1989
Exploration (all projects)	$18.01	$20.0
Development (operating Mines)	$18.50	$50.0
Total	$36.51	$70.0

TABLE 4-2
SOUTH CENTRAL DISTRICT
EXPLORATION & DEVELOPMENT EXPENDITURES AT OPERATING MINES

	($Millions)	
Mine	Exploration	Development
Highland Valley Copper	$0.7	$14.1
Afton/Ajax	$0.17	--
Similco	$2.0	$1.5
Samatosum	$1.2	$1.0
Nickel Plate/Canty	$0.18	$1.2
Highland Bell (Beaverdell)	$0.12	$0.2
Brenda	Closed June 1990	
Candorado	--	$0.5
Totals	$4.37	$18.5

Exploration Projects-South Central B.C.

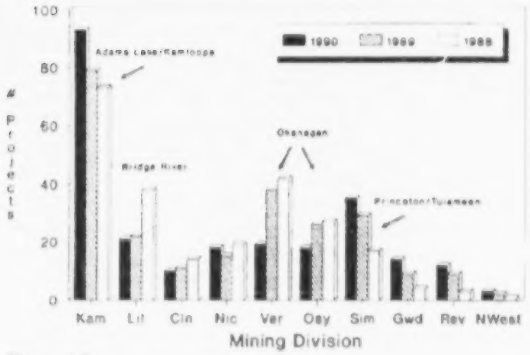

Figure 4-3

Mineral Exploration Expenditures 1990
South Central B.C.

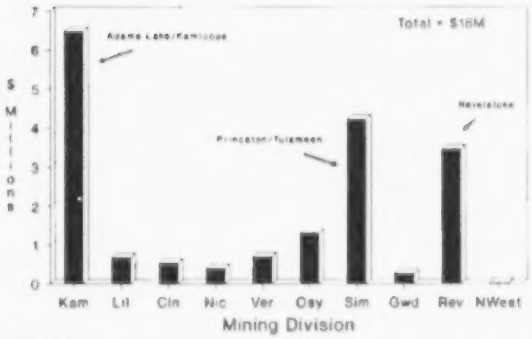

Figure 4-4

million, compared with $50 million estimated for 1989. However, the 1989 figure included development costs for two new mines, Afton Operating Corporations **Ajax** deposit and Minnova's **Samatosum** mine. The bulk of the 1990 development budget went to general construction and expansion at Highland Valley Copper.

Regionally, the Adams Lake and Kamloops areas far surpass the rest of the district in exploration activity (Figure 4-3), exhibiting a steady increase over the past three years. The Princeton-Tulameen area is a somewhat distant second, but also shows increased activity, due in large part to major programs near Siwash Lake and at Copper Mountain. The Revelstoke and Greenwood areas have had modest, but notable increases in the numbers of projects, over previous years. However, in spite of the relatively few operators, exploration expenditures for the Revelstoke area rank third in the district (Figure 4-4), primarily due to the advanced stage of the **J & L project**. This factor illustrates the impact that just one advanced stage project can have on a region. By contrast, the steady decline of exploration activity and the lack of major projects in the Okanagan and Bridge River areas have seriously changed the industry picture in these two exploration camps in only two years.

On a parallel trend with steadily increasing activity in the Adams Lake, Kamloops and Revelstoke areas, the progressive shift toward base metals oriented projects in the region is another reflection of strengthening base metal markets, particularly for copper and zinc. In the intermediate term, these areas are likely to capture an increased share of exploration funding, particularly if gold and silver prices remain weak. The decline in activity in the Okanagan, Hedley and Bridge River areas also reflects an overall decreasing focus on vein and skarn precious metals targets.

HIGHLIGHTS

- **ADAMS LAKE** - The Eagle Bay asemblage and Fennell Formations near Adams Lake continue to draw the highest level of exploration activity, stimulated by the success of the **Samatosum polymetallic project** operated by Minnova Inc. and Rea Gold Corporation. Major projects, such as those operated by Minnova, Homestake Mining Canada Ltd. and others in the area, continued to focus on the "Sam" and "Rea" horizons and on comparable geological environments in Eagle Bay rocks. Minnova also expended considerable effort on areas within the Fennell Formation, associated with the Chu Chua copper-iron massive sulphide deposit.
- **SIWASH LAKE** - In the Siwash Lake area, northeast of Princeton, the potential of the **Elk gold project** was substantially upgraded as Fairfield Minerals Ltd. and Placer Dome Inc. completed a second successful year. Detailed drilling on the Siwash North zone increased both the lateral and down-dip extent of the deposit and expanded work on other prospects on the property suggests that a major area-wide gold-quartz vein system may be present.
- **COPPER MOUNTAIN** - An aggressive exploration drilling program at Similco's **Copper Mountain** deposit has outlined two new zones in the Lost Horse Gulch area. The **Virginia** and **Alabama** deposits will add nearly 25 million tonnes of potentially mineable copper-gold ore to the mine's reserves.
- **REVELSTOKE** - Exploration activity in the area north of Revelstoke increased over previous years, with the main focus on Early Paleozoic rocks hosting the **J & L** and **Goldstream** deposits. Equinox Resources Ltd. and Cheni Gold Mines joined efforts at J &

L to expand and develop mineable reserves in the deposit. Recent reports that funding may soon be in place to return the Goldstream mine to production are positive indications that exploration and mining in the Revelstoke area are in an upward trend.

- **OKANAGAN** - The Okanagan was considerably quieter during 1990 than in the 1987-89 period. A number of small to mid-size precious metals projects were operated in spite of the strain of poor financing. Work at the **Vault** epithermal gold project was maintained, albeit under pressure. Closure of the **Brenda** operations and news that the **Highland Bell** silver mine would close early in 1991 dampened the economic outlook for the Okanagan and marked the end of 90 years of continuous operation at Beaverdell.
- **HEDLEY** - At Hedley, Corona Corporation has indicated that without an improved reserves picture, the **Nickel Plate** operations will likely end in late 1991.
- **BRIDGE RIVER** - The area experiencing the greatest downturn in mineral exploration in the region was the Bridge River district, where, except for the **Standard Creek** property, only minimal work was completed on very few projects.
- **ECONOMIC IMPACT** - The downturn in exploration resulting largely from the lack of project funding has created significant economic stress on the exploration-related service sector of the South Central District. Drilling companies, assay laboratories, staking and line-cutting contractors and equipment suppliers have all felt the effects in the form of drastic reductions in contracts and clientele. The withdrawal from activity by many project operators has forced a few companies to temporarily close their doors due to insufficient business. In other situations, work-sharing and lay-offs are becoming reality, whereas in previous years, sufficient work was available to carry a nearly full compliment of staff through to the next exploration season.

MINERAL EXPLORATION

ADAMS LAKE AREA

The Eagle Bay assemblage and Fennell Formation in the Adams Lake area continue to be the prime focus in south-central British Columbia (Figure 4-5). Influenced by the highly successful Samatosum project, the industry expended more than 20 per cent of the total district exploration budget in this region. In total, 15 drilling projects and associated surface programs were carried out for Samatosum-type and Rea-type precious metal rich polymetallic sulphide deposits.

The **Samatosum mine**, Minnova Inc. continued to operate exploration drilling programs throughout the year, concentrating primarily on the horizons hosting the Samatosum and Rea Gold deposits. A 200-metre exploration adit was commenced at the mine early in the fall, to explore the lower sections of the deposit in preparation for underground mine planning. The company has also begun a comprehensive research project with McGill University to evaluate the genesis of the deposit. Immediately to the north, Minnova also drilled the Cana property. The mine stratigraphic sequence continues into this area, but is overlain by a substantial thickness of Tertiary basalt, which seriously hampers exploration. Previous drilling by Homestake Mining Canada Ltd. and Esso Resources intersected weak sulphide mineralization.

Two new prospects were discovered in the Adams Lake region during 1990, by prospecting outcrops created along recently constructed logging roads; the **Mila** property, east of Vavenby, and the **McLellan** prospect, south of North Barriere Lake. At the north end of the area, on the Mila claims, Goldbank Ventures Ltd. and International Suneva Resources Ltd. exposed significant new massive sulphide mineralization which carries encouraging values in zinc, copper and gold. The mineralization occurs in a sequence of Lower Paleozoic quartz-chlorite-sericite schists and phyllites of the Eagle Bay assemblage. At the McLellan property, which is under option to Rea Gold Corporation, only preliminary surface work has been carried out.

Minnova Inc. continued work at the **Chu Chua** property, under option from owners International Vestor Resources Ltd., Quinterra Resources Inc. and Pacific Cassiar Limited. The 1990 drilling program was aimed at testing a newly outlined geophysical anomaly, located about 2 kilometres south of the main deposit. Minnova carried out airborne geophysical surveys in the region earlier in the summer. South of Chu Chua Mountain, on the **Chinook Mountain (CM)** property, Minnova completed extensive geochemical and geophysical surveys, followed up by diamond drilling.

At the **Birk Creek** property, Falconbridge Limited concentrated exploration on a number of showings, as well as geochemical and geophysical (IP) targets. The main showing of interest is the **Uki** prospect, a high-grade polymetallic zone occurring in Eagle Bay chlorite-sericite schist and phyllite. Sampling in 1989 returned values as high as 5 per cent lead, 4.5 per cent zinc, 0.66 per cent copper, 0.35 grams per tonne silver and 1 gram per tonne gold.

On the **Honeymoon** property east of Clearwater, Minnova completed extensive geophysical and geochemi-

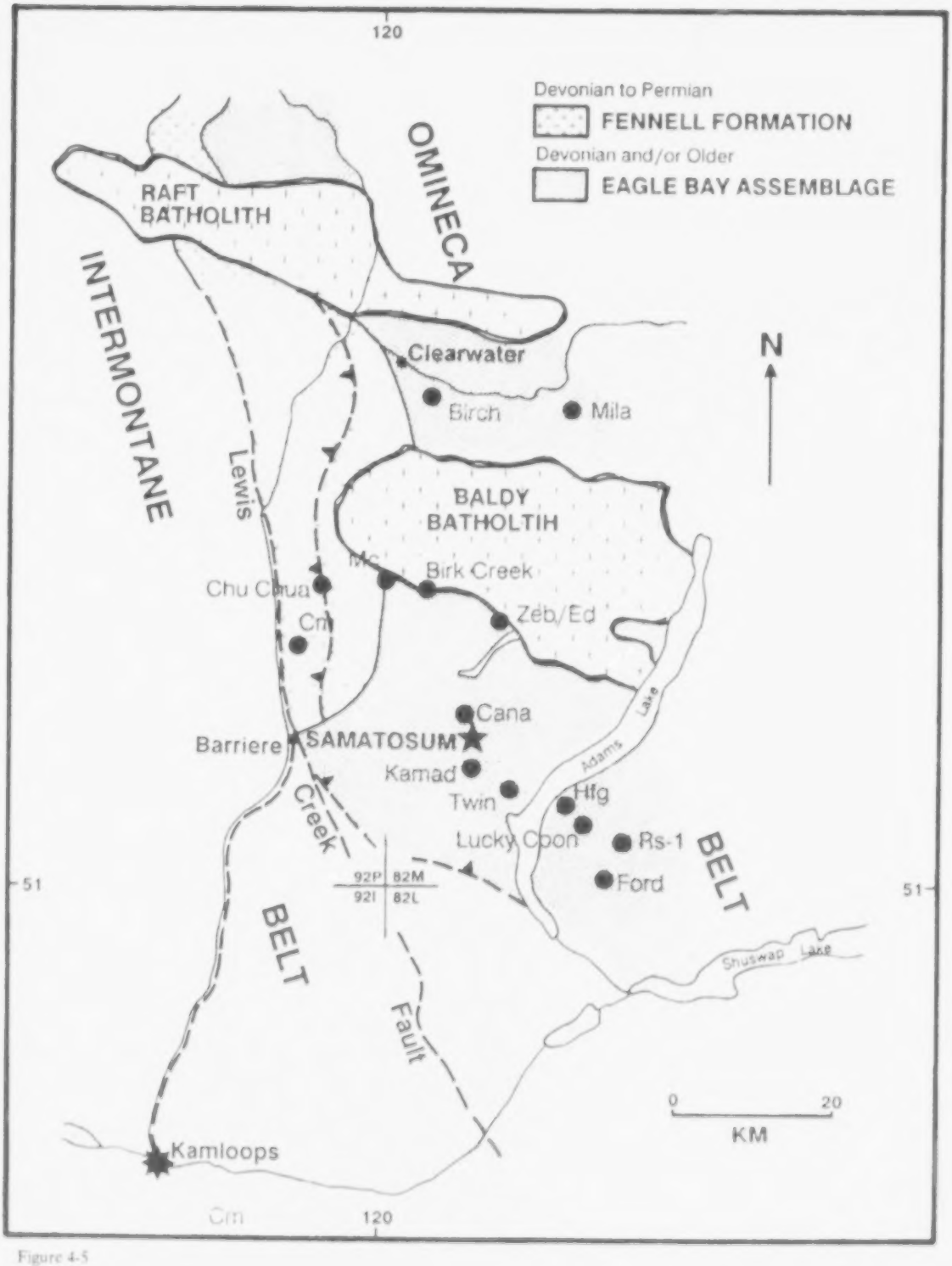
120
Devonian to Permian
FENNELL FORMATION
Devonian and/or Older
EAGLE BAY ASSEMBLAGE
RAFT BATHOLITH
OMINECA
INTERMONTANE
Clearwater
N
Birch
Mila
Lewis
BALDY BATHOLTIH
Birk Creek
Chu Chua
Cm
Zeb/Ed
Cana
Barriere
SAMATOSUM
Adams Lake
Kamad
Twin
Hfg
Creek
Lucky Coon
Rs-1
BELT
51
92P 82M
92I 82L
Ford
51
BELT
Shuswap Lake
Fault
0
20
KM
Kamloops
Cm
120

Figure 4-5

cal surveys. The property is underlain by Paleozoic metasedimentary and volcanic rocks of the Fennell Formation. Adjacent to this ground, to the east, Initial Developers Ltd. drilled the **MC** property and a few kilometres to the northeast, New Global Resources Ltd. drilled the **Birch** massive sulphide prospect. Targets on both properties are polymetallic zinc-lead-silver occurrences in Eagle Bay and Fennell rocks. On the **Zeb** property, near Saskum Mountain, Duchan Enterprises Ltd. carried out surface surveys, trenching and a small drilling program to test a strong EM conductor. A thin shear-hosted sulphide lens was intersected, but returned low precious metals values.

Homestake Mining Canada Ltd. continued with a major diamond drilling program on the adjacent **Twin** and **Kamad** properties. The two properties are underlain by Eagle Bay rocks, including quartz-sericite schists and ankeritic mafic volcanic rocks which collectively incorporate the southeastern extension of the stratigraphic horizons hosting both the Samatosum and Rea Gold deposits. In 1987 drilling on the Twin 3 claim delineated a gold-bearing massive sulphide lens and in 1988 Esso discovered the **K-7** massive sulphide lens on the Kamad 7 claim, which lies on the "Rea" zone.

The Eagle Bay assemblage was also explored on the Adams Plateau, east of Adams Lake. Teck Explorations Ltd. continued with trenching and diamond drilling on the **RS-1 claim**, optioned from Kamad Silver Co. Ltd. Polymetallic sulphide mineralization occurs with garnet-diopside-epidote skarn zones hosted in Eagle Bay metavolcanic rocks and phyllites. The sequence is cut by small diorite intrusions believed to be the most likely cause of skarn alteration. Teck Exploration also completed surface surveys and drilling on the **Ford** property, where minor copper and silver mineralization occurs in sericitic and chloritic schists. The results from both programs were generally discouraging and Teck plans to return the properties to their owners.

Early in the year, Sirius Resource Corporation completed drilling on the **Lucky Coon** prospect to extend a mineralized zone outlined in an earlier program. The work met with only limited success and the company has since dropped its interest in the property. West of the Lucky Coon, Gala Resources Ltd. drilled the **HFG-WIM** claims to test geochemical and geophysical anomalies outlined in previous work. On the **Magna** claims, to the east of Scotch Creek, W. Spence drill-tested geochemical and geophysical anomalies in Eagle Bay rocks.

KAMLOOPS - BONAPARTE AREA

The **Rayfield River property**, northwest of Vidette Lake, was operated by Brenda Mines Ltd. (Discovery Consultants), who completed geophysical surveys and a diamond-drilling program. The program targeted porphyry copper-gold mineralization associated with syenite, monzonite and granodiorite of the Early Jurassic Thuya batholith, exposed in a window within Miocene plateau basalts. Although weak copper mineralization in the form of chalcopyrite, bornite and native copper is widespread on the property, grades encountered were very low, with only geochemically anomalous gold values.

At the **Taweel Lake** gold prospect, west of Clearwater, Jaguar Equities Inc. completed geochemical surveys and diamond drilling in an attempt to outline a gold-anomalous quartz-carbonate alteration and vein system hosted in Nicola volcanic and sedimentary rocks. Drill results were not encouraging in that they did not substantiate surface sample values outlined previously.

Teck Explorations Ltd. continued work on the **Haida** property northwest of Little Fort. Diamond drilling outlined magnetite-pyrrhotite-copper mineralization associated with diopside-garnet skarn in limy Nicola rocks which are intruded by pyroxene gabbro and feldspar porphyry dikes. Weak porphyry-style copper mineralization was also encountered on the property. On the **Golden Loon** property, west of Little Fort, Corona Corporation completed trenching and drilling on gold geochemical anomalies underlain by felsic to intermediate intrusives and ultramafic rocks of the Thuya batholith. Minnova Inc. drilled the **Last Chance** property near Chris Creek. Epithermal gold mineralization is the target, associated with structures cutting Jurassic Ashcroft conglomerate where it is overlain by Tertiary basalts.

On the south side of the Late Triassic Iron Mask batholith, Afton Operating Corporation drilled several holes at the southern edge of the **Ajax West** deposit to determine the lower limits of ore reserves for the Stage II pit. The northeast extension of the East pit was also drilled off to explore the possibility of a north-wall push-back. East of the Ajax mine, Placer Dome Inc. completed nine drill holes for 1200 metres on the **Knut** alkaline porphyry copper-gold property. The program tested coincident chargeability and gold geochemical anomalies, also in Iron Mask rocks. Northwest of the Ajax mine, Getchell Resources Inc. completed a drilling program on the **Galaxy** property, another porphyry copper-gold deposit. Work on this property in the 1960s outlined approximately 3.2 million tonnes grading 0.65 per cent copper. Intersections from 1990 drilling returned weighted averages of 0.74 per cent copper and 3.4 grams per tonne gold.

KAMLOOPS - NICOLA BELT

East of Kamloops, near Monte Creek, Corona Corporation drilled the **Pooley Lake** property, a precious metals prospect associated with epigenetic vein

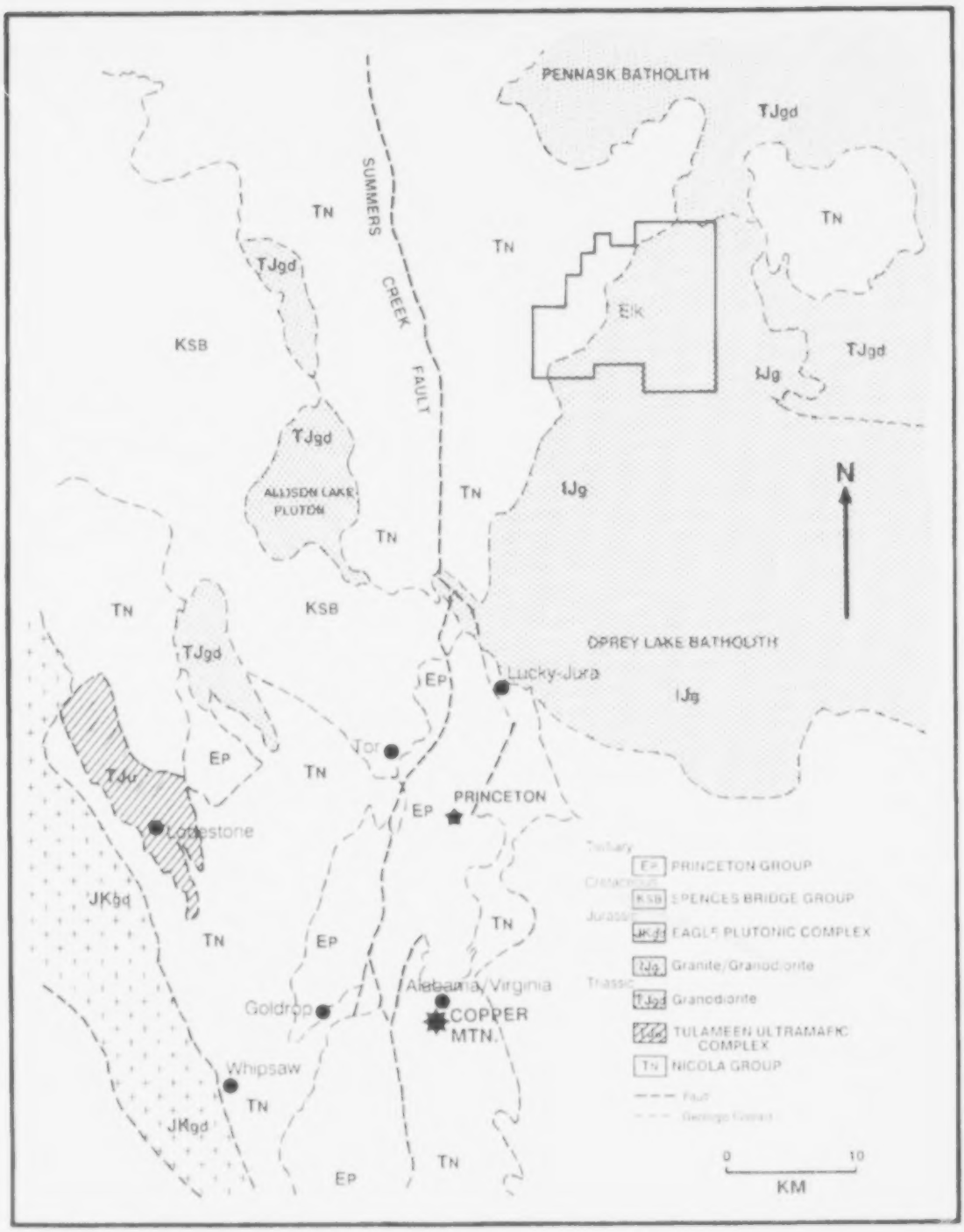
PENNASK BATHOLITH
TJgd
TN
SUMMERS CREEK FAULT
KSB
Elk
TJgd
lJg
ALLISON LAKE PLUTON
EP
Lucky Jura
OPREY LAKE BATHOLITH
Tor
PRINCETON
Lodestone
JKgd
Goldrop
Alabama/Virginia
COPPER MTN.
Whipsaw
N
Tertiary
EP PRINCETON GROUP
Cretaceous
KSB SPENCES BRIDGE GROUP
Jurassic
JK-gd EAGLE PLUTONIC COMPLEX
lJg Granite/Granodiorite
Triassic
TJgd Granodiorite
TULAMEEN ULTRAMAFIC COMPLEX
TN NICOLA GROUP
Fault
Geologic Contact
0
10
KM

Figure 4-6

mineralization. North of this property, L. Loehr drilled the **Triple L** claim, another precious metals vein prospect.

In the Shumway Lake area, south of Kamloops, Naxos Resources Ltd. completed a second phase of drilling on the **Road 4** claims. The target is bulk-tonnage, low-grade gold mineralization reported to be associated with mafic rocks intruding Upper Triassic Nicola volcanic stratigraphy. A number of properties in the same area, including the **Nord**, **Add**, **JJ**, **Ban**, **Camp**, and **Rose**, are underlain by similar geology. These properties were drilled by several junior companies associated with A. Babiy, L. Mcar and M. McElgunn. To the south, near Stump Lake, the **Eagle** and the **Stmp** claims were also drilled by the same interests.

Several small to mid-size drilling programs were also completed in Nicola rocks south of the Iron Mask batholith, between Kamloops and Merritt. At Greenstone Mountain, Teck Explorations Ltd. drilled the **Rag/Happy Days** property to test low-grade gold potential. The prospect is an alkaline porphyry copper-gold occurrence associated with Early Jurassic monzonite-diorite rocks intruding Nicola andesite. Previous work by Cominco Ltd. reported widespread, but low grade copper and minor gold mineralization on the property. To the northwest, Mad River Resources Inc. completed geochemical surveys and drilling on the **Model Anne** prospect. This is a structurally hosted epithermal precious metals target associated with widespread cinnabar mineralization and Tertiary faults. Brenda Mines Ltd. drilled the **Oz** copper-gold property, but obtained discouraging results and have since dropped the property. On the **Kamrose** property, east of Knutsford, C. Boitard drill-tested an induced polarization anomaly related to widespread pyrite mineralization. South of Swakum Mountain, C. Hagel carried out geophysical surveys, trenching and drilling on the **Abba** prospect, where copper and gold vein mineralization occur in Nicola volcanic rocks and Jurassic Ashcroft conglomerate. At Nicola Lake, Iota Explorations Ltd. drilled the G&G 1 claim, a copper-gold prospect associated with dioritic rocks intruding Nicola volcanics. West of the Craigmont mine, near Merritt, Better Resources Ltd. continued work on the **Betty-Lou** property, where **Craigmont**-type copper-iron skarn mineralization is the target. On the Craigmont property, Craigmont Mines Ltd. (M-7 Industries Ltd.) has initiated a project to recover magnetite from the mine tailings for use in the coal industry. The project has been submitted to the Mine Development Steering Committee.

In the Guichon batholith, a drilling program was carried out at the **Highland Valley Copper mine** to explore a potential southern extension of the Valley orebody. Significant new copper-molybdenum mineralization was encountered and is being evaluated.

Princeton - Tulameen Area

This area encompasses most of the Similkameen region, west of the Okanagan Valley, and extends north to the Aspen Grove area, in the Nicola volcanic belt (Figure 4-6). Two major projects are highlighted; one in the north, at Siwash Lake and one in the south, at the Copper Mountain mine. Several other drilling programs were carried out on properties distributed throughout the area.

At Siwash Lake, east of Aspen Grove, Fairfield Minerals Ltd. and Placer Dome Inc. completed the second major program on the Elk property, which consisted of surface surveys, trenching and extensive diamond drilling. The property is underlain by the mid-Jurassic Osprey Lake granodiorite at its contact with Nicola volcanic rocks. Fairfield discovered the **Siwash North gold zone** during early surface work in 1988. A detailed trenching program was completed in 1989, followed by drilling, which has continued through 1990. Gold mineralization in the Siwash North zone is structurally controlled in the form of a shallow-dipping quartz-vein system that has been traced on surface for about 1.5 kilometres and intersected in drill holes for about 500 metres along strike and to 250 metres depth. There are at least four other gold-anomalous areas on the property remaining to be explored in detail. Significant gold mineralization was intersected on the **Lake zone**, following a trenching and drilling program in that area.

Similco Mines Ltd. undertook an aggressive exploration program at the **Copper Mountain mine** south of Princeton. More than 180 drill holes were completed, the majority of which were in the Lost Horse gulch area, north of the main open-pit operations. As a result, two adjacent, potentially mineable copper-gold zones were delineated in 1990, in an area originally planned for waste-rock storage. The **Virginia zone** contains an estimated 14 million tonnes grading 0.4 per cent copper and the **Alabama zone** has about 9 million tonnes of 0.32 per cent copper. The precious metals grade of both zones is about 2.5 times the average mine grade and has the effect of enhancing copper grades by about 25 per cent (copper equivalent). Similco is reviewing plans to incorporate the Virginia deposit into 1991 mining plans.

Southwest of the Copper Mountain area, two small projects were operated near Whipsaw Creek. World Wide Minerals Ltd. drilled the **Whipsaw** property, a copper-molybdenum porphyry prospect with associated gold-bearing quartz veins. M. Shewchuk drilled the **Goldrop** claim to the northeast, where copper and zinc

mineralization are associated with quartz-carbonate veins and alteration.

Elsewhere in the area, Cominco Ltd. drilled the **Lucky-Jura** claims, north of Princeton. Copper-gold mineralization occurs in intermediate volcanic rocks of the Upper Triassic Nicola Group. The program met with limited technical success. In the same area, E. Wedekind and associates drilled the **Tor** claims, a shear-hosted copper-gold prospect. To the east, in the Tulameen ultramafic complex, Tiffany Resources Inc. continued work on the **Lodestone** property. Magnetite and minor chromite occur as magmatic segregations in pyroxenitic rocks, with reported values averaging about 17 per cent iron and traces of platinum.

Hedley Area

Exploration in the Hedley area was relatively quiet during 1990, with only two major projects operated. Corona Corporation completed extensive diamond drilling in the North and South pit areas of the **Nickel Plate mine**. Additional gold-bearing skarn mineralization was outlined in the North pit and the feasibility of a limited expansion of that zone is under review. At Mount Riordan, work continued on the Polestar Exploration Inc. **Crystal Peak** industrial garnet project (*see* INDUSTRIAL MINERALS). A limited program of diamond drilling, reclamation and geotechnical work was carried out and an agreement for project financing was announced. The program continues under close observation from local environmental interest groups.

Okanagan Region

VERNON MINING DIVISION

Several small to mid-size drilling projects were carried out in the Northern Okanagan, near Vernon. B.P. Resources Canada Ltd. drilled the **Lavington** property, where anomalous gold values occur in an altered and pyritized shear zone within Devonian Eagle Bay schists. Unfortunately, the area has become the focus of environmental issues which have hampered exploration progress and the company plans to terminate its interest. To the east, near Lumby, J. Hilton drilled the **B.S.** and **OK** properties, both of which are shear-hosted gold prospects in Late Triassic Sicamous rocks.

South of Cherryville, Commonwealth Gold Corporation completed 110 metres of underground drifting and sampling on the **Top** gold prospect. Gold-bearing quartz veins and shear zones occur in Late Cretaceous Whatshan Peak granodiorite. Farther to the south, two additional intrusive-hosted gold vein prospects were drilled; both occur in mid-Jurassic Nelson granodiorite. Golden Sky Resources Inc. drilled the **Lynx** property and Annax Ventures Inc. drilled the **Xen/Carol** (Winnifred Creek) prospect.

West of Okanagan Lake, in the Whiteman Creek area, Huntington Resources Inc. completed additional surface sampling and a small drilling program on the **Brett** property. The Brett is an epithermal gold deposit, which underwent considerable exploration activity during 1987-89, but was hampered in 1990 by a lack of funding. To the north, near Falkland, Corona Corporation drilled the **Jewel** property, a copper-gold prospect associated with diorite intruding late Paleozoic to early Mesozoic sedimentary rocks.

OSOYOOS AND GREENWOOD MINING DIVISIONS

The southern Okanagan was again the focus of a number of small to mid-size exploration programs. At Okanagan Falls, Inco Gold Management Ltd. continued with another substantial drilling program on the **Vault** epithermal gold deposit. Two zones were drilled during 1990. East and west extensions of the North vein were tested and additional holes were drilled in the Central (main) zone. The North vein, which extends to surface, was estimated in 1989 to contain some 152 000 tonnes grading 14 grams per tonne gold. The Central zone is a much larger, but deeper and more complex zone with typically lower gold grades. The project was hampered in 1990 by a Section 35 claim dispute and by corporate problems of joint venture partners Seven Mile High Group. Both issues were resolved in favour of the project. Elsewhere in the region, Oliver Gold Corporation drilled extensions of the **Fairview** vein system. Northwest of Fairview, Orequest Consultants Ltd. completed a comprehensive trenching and drilling program at the **Orofino Mountain** lode gold prospect. South of Oliver, at Mount Kobau, Minnova Inc. carried out geochemical and geophysical surveys and diamond drilling on the **Richter** gold project. Targets here are silicified shears and quartz veins cutting Carboniferous metasedimentary rocks of the Kobau Group. West of Osoyoos, the **Mam** gold prospect was explored by Toba Gold Resources Ltd., which completed minor underground development and sampling. Mineralization occurs as precious and base metal bearing quartz veins within the Jurassic Osoyoos granodiorite. In the Camp McKinney area, Crown Resources Corporation carried out geochemical and geophysical surveys and percussion drilling on the **Dayton** property. Targets are structurally controlled gold-silver occurrences in late Paleozoic Anarchist Group rocks.

At the **Highland Bell** silver mine, near Beaverdell, Teck Corporation carried out extensive underground drilling in an attempt to improve the ore reserve picture. Late in the year, however, the company announced that

the mine would cease operations early in 1991. To the north, Placer Dome Inc. drilled the **Carmi Moly** property, to confirm earlier data and obtain structural information. A 1988 reserves study reported on the deposit for owners International Vestor Resources Ltd. and Dymac Oil Ltd., estimated approximately 21 million tonnes grading 0.106 per cent molybdenite.

REVELSTOKE AREA

Exploration for stratiform base and precious metals deposits in Paleozoic metasedimentary and metavolcanic rocks was continued north of Revelstoke, in the area east of the Columbia River (Figure 4-7). **The J & L project**, operated by Equinox Resources Ltd., continues to be the largest and most comprehensive of the area. The property was inactive for much of the year, following completion of metallurgical test work begun late in 1989. In the fall of 1990, Equinox entered into an agreement with Cheni Gold Mines Inc., whereby Cheni will fund a major underground exploration program to expand the current mineable reserves. Cheni can earn a 60 per cent interest in the property by funding all exploration work, a feasibility study and all capital costs required to bring the property to commercial production. The current work is expected to continue until early in 1991.

Near the Goldstream deposit, Orequest Consultants Ltd. operated programs on the **Goldstream** and **Brew** properties controlled by Bethlehem Resources Corporation and Goldnev Resources Inc. Airborne geophyical surveys were completed on and adjacent to the **Goldstream mine**, with follow-up ground geophysical and geochemical surveys. A short drilling program was also completed on the **Brew/Montgomery** property. The results of the 1990 work will be used to generate drill targets for future programs. Bethlehem Resources also completed limited drilling on the **Keystone** property, south of the Goldstream area. The work was designed to test the extension of several sulphide horizons and soil geochemical anomalies outlined in 1989. At year-end Bethlehem and Goldnev initiated an agreement with Nippon Mining Co. Ltd. and Sumitomo Corporation to fund the rehabilitation and development of the Goldstream mine and mill complex. Pending completion of financing, the operation could be put into production later in 1991. Reserves for the planned operation are currently reported at 1.86 million tonnes grading 4.81 per cent copper and 3.06 per cent zinc, using a 3 per cent copper cut-off grade.

Farther north on the Columbia River, the **Mica** and **Rift** prospects were separately explored by Corona Corporation and 9041 Investments Ltd. (Beaumont Logging). Corona's drilling attempted to extend massive sulphide mineralization on the Mica showing, a 2-metre-thick zinc-lead horizon discovered in 1985. The prospect is about 400 metres southeast of the Rift prospect, where a number of thin zinc and lead-bearing pyritic zones occur in lower Paleozoic calcsilicates and marbles. On the Rift prospect, trenching, geochemical sampling and drilling were completed by 9041 Investments Ltd., which controls only the base metal rights on the property. Corona Corporation owns the precious metals rights on the Rift, as well as a 100 per cent interest on the Mica property.

BRIDGE RIVER AREA

The Bralorne and Gold Bridge areas were again fairly quiet, with only three major projects. Armeno Resources Ltd. completed geochemical and geophysical surveys and percussion drilling on the **Standard Creek** gold prospect. The 1990 drilling was done near Piebiter Creek where 1987 work outlined encouraging gold and minor copper values over substantial widths.

Golden Rule Resources Ltd. drilled the **Gold Bridge** property, north of Carpenter Lake. Precious and base metals mineralization occurs as sulphide-rich veins associated with felsic dikes cutting Paleozoic ribbon cherts of the Fergusson Group (Bridge River Complex). Consolidated Balsam Resources Corporation carried out minor drilling at the **Yalakom** property, near the north end of the Shulaps ultramafic complex. Gold-bearing quartz veins are hosted in porphyritic quartz diorite that intrudes serpentinites of the complex. Sulphide mineralization in the form of pyrite, arsenopyrite, chalcopyrite, galena, sphalerite and pyrrhotite, occurs the quartz vein system.

INDUSTRIAL MINERALS

Industrial minerals projects typically account for a relatively small portion of exploration activity in the South Central District. The main commodities and products of interest in 1990 include abrasives, limestone, silica and gypsum for cement and other industrial uses, flagstone and tile, clay products for absorbants and thickeners, and magnesite and talc.

Several industrial minerals operations were active during the year. East of Kamloops, Lafarge Canada Inc. produces cement products from the Harper Ranch limestone quarry. The operation also incorporates silica from the nearby Buse Lake property and gypsum from the quarry at Falkland. West of Cache Creek, at Pavillion Lake, Continental Lime Ltd. produces limestone, primarily for use in the construction industry. Flagstone and tile products are produced from several locations in the district; south of Revelstoke, at the Revelstoke Flagstone quarry (mica schist), the Mighty White Dolomite Ltd. quarry at Rock Creek and the Beaverdell

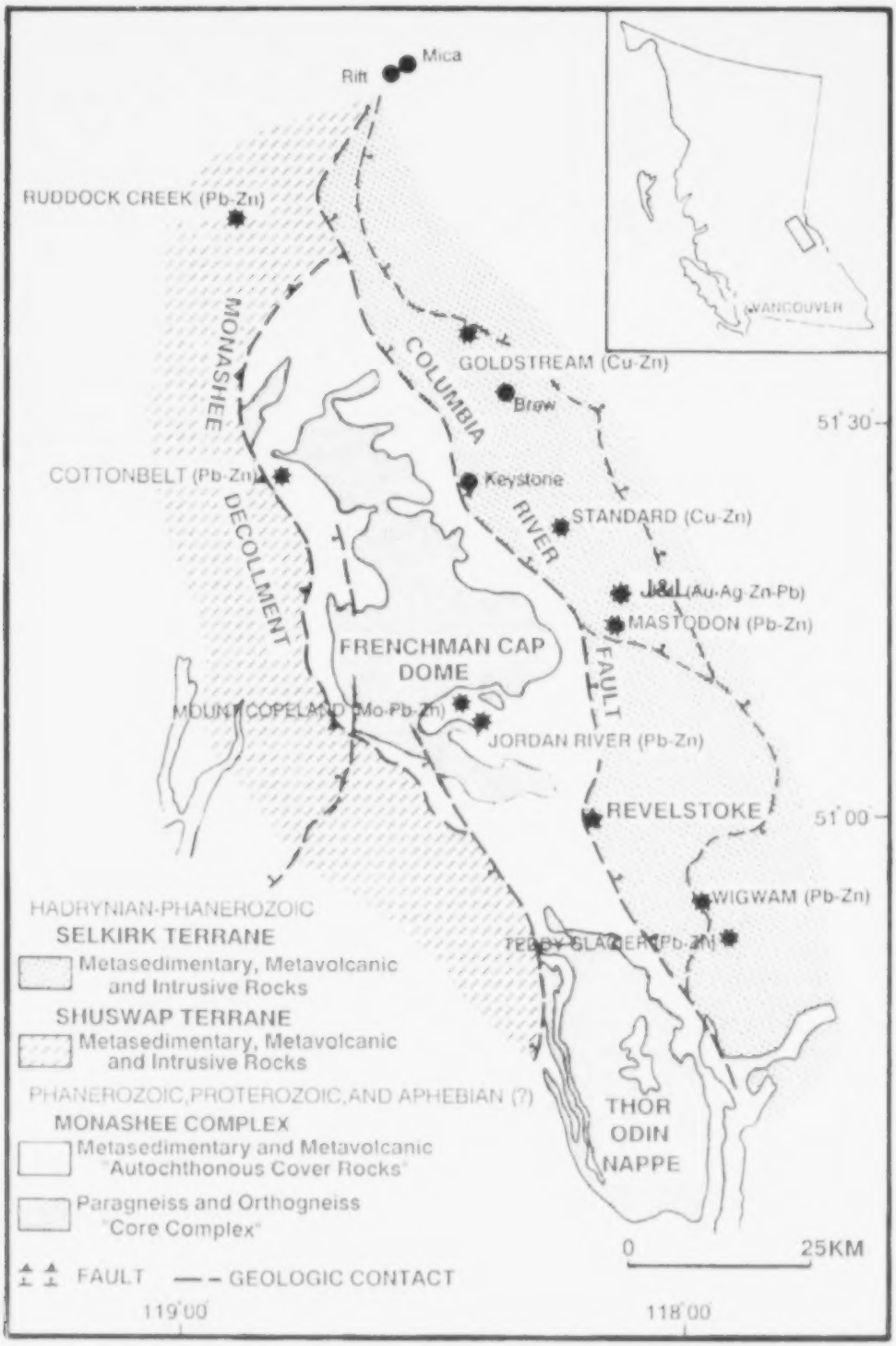
Mica
Rift
RUDDOCK CREEK (Pb-Zn)
MONASHEE
COLUMBIA
GOLDSTREAM (Cu-Zn)
Brew
51°30'
COTTONBELT (Pb-Zn)
Keystone
DECOLLMENT
RIVER
STANDARD (Cu-Zn)
J&L (Au-Ag-Zn-Pb)
MASTODON (Pb-Zn)
FRENCHMAN CAP DOME
FAULT
MOUNT COPELAND (Mo-Pb-Zn)
JORDAN RIVER (Pb-Zn)
REVELSTOKE
51°00'
WIGWAM (Pb-Zn)
TEDDY GLACIER (Pb-Zn)
THOR ODIN NAPPE
VANCOUVER
HADRYNIAN-PHANEROZOIC
SELKIRK TERRANE
Metasedimentary, Metavolcanic and Intrusive Rocks
SHUSWAP TERRANE
Metasedimentary, Metavolcanic and Intrusive Rocks
PHANEROZOIC,PROTEROZOIC,AND APHEBIAN (?)
MONASHEE COMPLEX
Metasedimentary and Metavolcanic "Autochthonous Cover Rocks"
Paragneiss and Orthogneiss "Core Complex"
FAULT
GEOLOGIC CONTACT
0
25KM
119°00'
118°00'

Figure 4-7

Granite quarry at Beaverdell. Dimension stone is also produced at the Beaverdell operation, as well as at the Gazdar granite quarry on Cayoosh Creek, southwest of Lillooet.

The largest industrial minerals exploration project in the region in 1990 is the **Crystal Peak** industrial garnet property operated by Polestar Exploration Inc. at Mount Riordan. Drilling during 1990 was directed toward detailed definition of the main ore zone, as well as geotechnical work for the mill site. Work is also progressing on a Stage I Report for the Mine Development Steering Committee. Late in 1990, the company entered into an agreement with Hawkeye Developments Ltd. to finance a feasibility study for the project. Drill-indicated reserves are currently estimated at 35 million tonnes grading 78 per cent andradite garnet.

At **Red Lake**, northwest of Kamloops, Western Industrial Clay Products Ltd. began limited production from a diatomaceous earth deposit in altered Eocene Kamloops Group volcanic rocks. The material is trucked to the company's Kamloops processing plant for manufacturing of industrial and domestic absorbants.

Northeast of Vernon, at Mabel Lake, R. Yorke-Hardy trenched and drilled a marble unit on the **Clifton** property. This unit occurs in gneisses correlated with the Paleozoic Eagle Bay assemblage, and is potentially a commercial source of flagstone and tile material. In the southern Okanagan, E. Carson drilled the **Sil** limestone/marble property, east of Keremeos. The property is underlain by limestones of the Carboniferous Blind Creek Formation, with estimated reserves of 40 million tonnes. Flagstone and tile are the targeted market products.

At the **Hat Creek bentonite deposit**, west of Cache Creek, Pacific Bentonite Ltd. operated a small auger-drilling program. The work tested peripheral areas of the deposit for extensions of bentonitic horizons discovered during exploration and development for the Hat Creek coal project. Piezometric studies in drill holes have also been initiated. South of Lytton, R. Lacombe drilled the **Gold Ridge talc-magnesite prospect**. The property is underlain by serpentinized ultramafites rocks intruding Late Triassic Nicola Group rocks. The property was formerly explored for gold.

OPERATING MINES

INTRODUCTION

Mining operations in the South Central District experienced a series of highs and lows during 1990. The industry was buoyed by generally strong copper and zinc prices, but was hurt by falling silver prices and generally low prices. Mine production for 1989 and 1990 are compared in Table 4-3. Production tonnage was higher at four operations and lower at two. **Highland Valley Copper** was back in full production following a major strike and reduction in copper output in 1989. Production at **Copper Mountain** fell slightly due to a major pit development, but the discovery of two new ore zones has improved the ore reserves picture. **Samatosum**, **Ajax** and **Candorado** all completed their first full year of production. British Columbia's silver production increased substantially during 1989-90 due largely to new production at the **Samatosum** mine.

On the down side, the **Brenda** operations was shut down by mid-year due to exhausted reserves, resulting in less than half of its normal output for copper and molybdenum. The **Beaverdell** and **Blackdome** (*see* Central District) mines were both scheduled for closure and dwindling reserves at **Nickel Plate** all serve to emphasize the region's critical need for new mineral resource development.

HIGHLAND VALLEY COPPER: The Highland Valley Copper joint venture operations mined 96.92 million tonnes of material in 1990, which included 47.09 million tonnes of ore grading 0.429 per cent copper and 0.0078 per cent molybdenum, and 49.83 million tonnes of waste. The Valley Copper pit supplied 36.78 tonnes of ore, with the balance of 10.31 million tonnes mined from the Lornex pit. The daily mill rate for the year averaged 129 000 tonnes per day. Ore reserves at year end were estimated as: proven: 729.4 million tonnes grading 0.41 per cent copper and 0.007 per cent molybdenum; probable: 101.31 million tonnes grading 0.36 per cent copper and 0.007 per cent molybdenum. The joint venture spent more than $14 million on development that included relocation of an in-pit crusher, raising the tailings dam, powerline and road construction, mill expansion and general improvements. An exploration drilling program was also carried out on the south extension of the Valley Copper orebody.

SIMILCO: Production at the Princeton Mining Ltd. Copper Mountain mine totalled 6 913 836 tonnes of ore grading 0.495 per cent copper, with significant gold content. Currently estimated reserves are: proven: 29 745 700 tonnes grading 0.477 per cent copper; probable and possible: 111 584 000 tonnes grading 0.39 per cent copper. Similco's aggressive exploration program in 1990 (see Princeton-Tulameen area), outlined two new zones of copper-gold mineralization in the Lost Horse Gulch area. One of the new zones, the Virginia deposit, may be included in 1991 mining plans. The company also carried out a $1.5 million expansion of the milling operation, which has increased copper recoveries by about 2.5 per cent.

TABLE 4-3
MINE PRODUCTION AND RESERVES
1989-1990
SOUTH CENTRAL DISTRICT

MINE	PRODUCTION 1990 TONNES (000s)	GRADE	1989 TONNES (000s)	GRADE	RESERVES (End 1990) TONNES (000s)	GRADE
Highland Valley Copper	47 090	0.429% Cu 0.007% Mo	33 000	0.43% Cu 0.01% Mo	776 500	0.41% Cu 0.007% Mo
Similco	6 194	0.495% Cu	7500	0.449% Cu	29 746	0.477% Cu
Samatosum	164.7	830 g/t Ag 0.9% Cu, 1.0% Pb 1.6% Zn 1.0 g/t Au	102.8	808 g/t Ag 1.1% Cu 2.8% Pb 3.6% Zn 1.6 g/t Au	460.4	679 g/t Ag 0.8% Cu 1.0% Pb 1.7% Zn 1.0 g/t Au
Afton/Ajax	2 676	0.55% Cu 0.39 g/t Au	2597	0.42% Cu 0.21 g/t Au	20 865	0.44% Cu 0.32g/t Au
Nickel Plate	1 141	2.502 g/t Au	936.4	2.88 g/t Au	938	2.605 g/t Au
Brenda	4 282	0.14% Cu 0.029% Mo	11 563	0.14% Cu 0.028% Mo	---	---
Highland Bell	36.3	311 g/t Ag	36.3	308 g/t Ag	---	---
Candorado	372	0.79 g/t Au	97.3	0.85 g/t Au	810	0.79 g/t Au

AFTON/AJAX: Production continued throughout 1990 at Afton Operating Corporation's Ajax copper-gold deposit south of Kamloops, with an average milling rate of 7332 tonnes per day. Total production was 2 676 195 tonnes grading 0.55 per cent copper and 0.39 gram per tonne gold, which included 2 104 669 tonnes from the west pit and 571 526 tonnes from the east pit. The operating rate was slightly below the rated capacity of 8165 tonnes per day. Afton completed a short diamond-drilling program in the pit area to further delineate ore-zone boundaries. All preproduction development costs for the two pits were reported in 1989.

SAMATOSUM: The Minnova Inc. Samatosum operation continued throughout 1990, with production and recovery rates better than anticipated at start-up. British Columbia's silver production showed a significant increase for 1989-90 following the commencement of Samatosum in mid-1989. The mine produced 164 723 tonnes of ore grading 830 grams per tonne silver, 0.9 per cent copper, 1.6 per cent zinc, 1.0 per cent lead and 1.0 gram per tonne gold. A comprehensive exploration program was on-going throughout the year. Late in the fall, an exploration adit was collared in the open pit to explore the lower part of the ore zone, in preparation for the later phase of underground production. Year-end reserves are estimated at 460 436 tonnes grading 679 grams per tonne silver, 0.8 per cent copper, 1.7 per cent zinc, 1.0 per cent lead and 1.0 gram per tonne gold.

NICKEL PLATE: Mine production at the Corona Corporation Nickel Plate mine was increased from 2900 to about 4000 tonnes per day for a total 1990 throughput of 1 141 255 tonnes grading 2.502 grams per tonne gold. Production from the Canty deposit began in October, 1990 and has proceeded with grades and recoveries as predicted. Reserves for the Canty are 435 000 tonnes grading 3.4 grams per tonne gold. Current overall reserves for the mine are 937 666 tonnes grading 2.605 grams per tonne gold and is expected to be exhausted by late 1991. However, 1990 exploration in the North pit outlined potentially mineable gold mineralization but would require substantial pit expansion. An additional mineral inventory of approximately 6 million tonnes, grading 2.57 grams per tonne gold may also be mined, depending on economic conditions. If this tonnage is developed and added to reserves, the operation would continue well into the future.

BRENDA: Mine production at the Brenda operations ceased, slightly ahead of schedule, on June 8th, 1990, following a major pit-wall failure. Mill throughput for the year (January to August, including stockpiles) totalled 4 281 870 tonnes averaging 0.14 per cent copper, 0.03 per cent molybdenum, 0.001 gram per tonne gold and 0.077 gram per tonne silver. The mine operated from 1970 to

1990 with two shutdowns due to low metal prices; from October 1983 to May 1984 and again from December 1984 to September 1985. Total production for the life of the mine is 181 787 700 tonnes averaging 0.15 per cent copper, 0.036 per cent molybdenum, 0.001 gram per tonne gold and 0.062 gram per tonne silver.

HIGHLAND BELL: Teck Corporation's Beaverdell silver remained in production throughout 1990 at 100 tonnes of ore per day, to produce 36 300 tonnes grading 311 grams per tonne silver, 0.103 gram per tonne gold and 1 per cent combined lead-zinc. After 90 years of continuous operation the mine will close at the end of February 1991 due to serious operating losses, falling silver grades and weak silver prices.

CANDORADO: Gold recovery from mine tailings at the Candorado Mines Ltd. leach plant continued throughout the year. The leach pad was expanded from a capacity of 100 000 tonnes to 410 000 tonnes. Expected recovery from the existing pad is about 286 kilograms (9200 ounces) of gold. The operation is now processing at a marginal rate due to low gold prices. Reserves of unprocessed tailings are estimated at 810 000 tonnes grading 0.79 gram per tonne, sufficient for about two more years of operation. The current source of tailings is located east of Hedley and originates from historical mining at the Nickel Plate mine. The company is reviewing the feasibility of processing tailings from the former Hedley Mascot mine, which are situated north of the town of Hedley. This would provide an additional supply of about 631 000 tonnes of material.

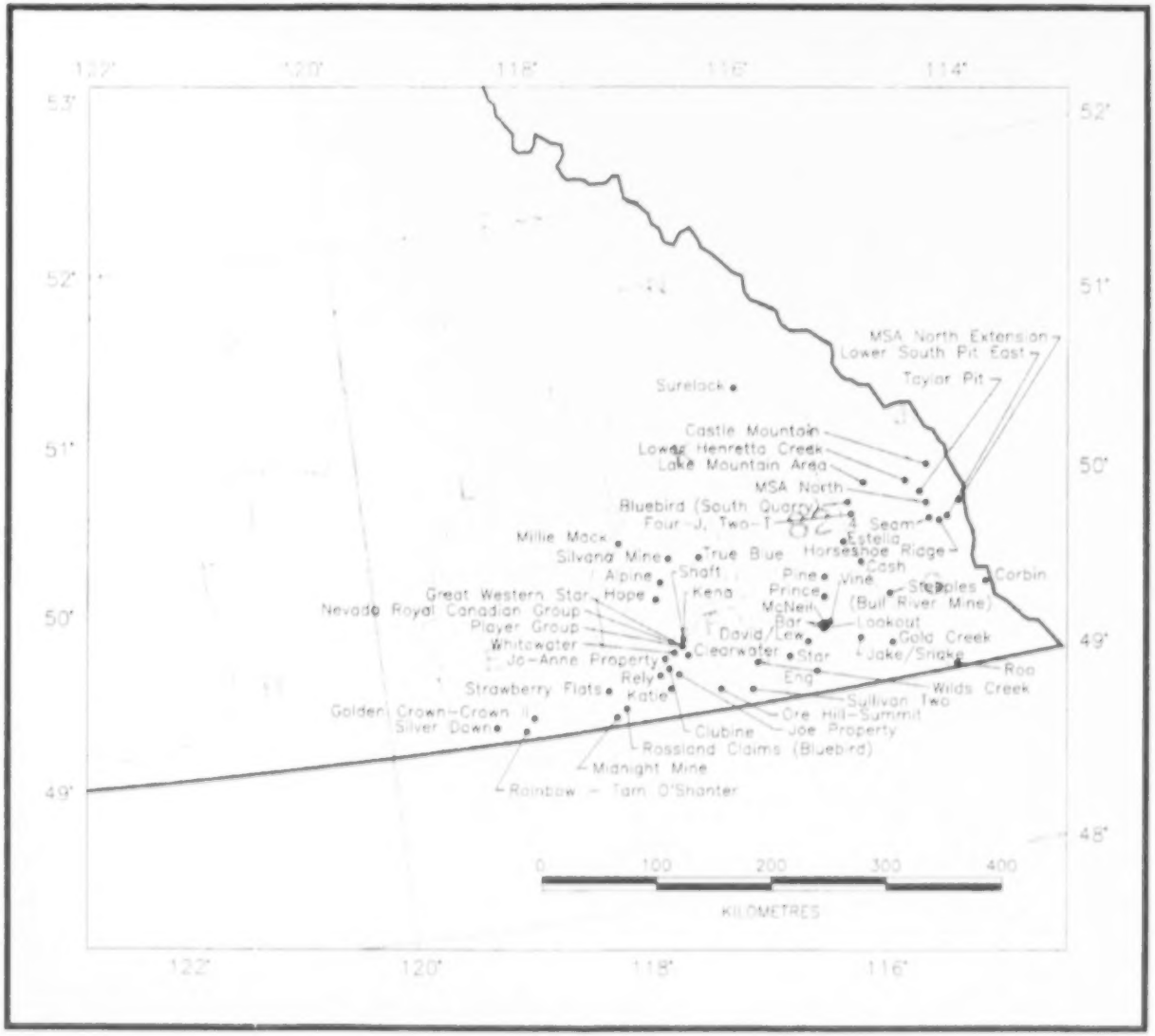
122°
120°
118°
116°
114°
53°
52°
51°
50°
49°
48°
MSA North Extension
Lower South Pit East
Taylor Pit
Surelock
Castle Mountain
Lower Henretta Creek
Lake Mountain Area
MSA North
Bluebird (South Quarry)
Four-J, Two-T
Seam
Estella
Millie Mack
Silvana Mine
True Blue
Horseshoe Ridge
Cash
Corbin
Alpine
Shaft
Pine
Vine
Great Western Star
Hope
Kena
Prince
Staples
(Bull River Mine)
Nevada Royal Canadian Group
McNeil
Player Group
Bar
Lookout
David/Lee
Gold Creek
Whitewater
Clearwater
Star
Jake/Snake
Jo-Anne Property
Roo
Rely
Eng
Strawberry Flats
Katie
Wilds Creek
Sullivan Two
Golden Crown-Crown II
Ore Hill-Summit
Silver Dawn
Joe Property
Clubine
Rossland Claims (Bluebird)
Midnight Mine
Rainbow - Tam O'Shanter
0
100
200
300
400
KILOMETRES

Figure 5-1

KOOTENAY DISTRICT

By Andrew Legun and Carlo Buttner
District Geology, Nelson

INTRODUCTION

As in the previous year, 1990 saw a broad spectrum of exploration activity directed toward precious and base metals, industrial minerals and coal. Over 300 Notices of Work were filed, compared to about 250 in 1989. About 60 of these programs involved significant expenditures. A number of proposed programs were cancelled due to problems with financing. Gold was the focus of metal activity but silver, lead, zinc and copper were also sought. Deposit types sought included sedimentary exhalative, vein, skarn, alkalic porphyry and shear-related deposits. The more active camps were Purcell, Nelson-Ymir and Greenwood. No new metal deposits entered the mine development review process. Cominco's Sullivan mine closed January 31, 1990 but reopened November 1 with a new production plan for the remaining reserves.

Coal exploration activity was about the same level as 1989, with three of the five coal mines conducting programs. In spite of improving prices for metallurgical and thermal coal, two mines, Byron Creek Collieries and Line Creek were put up for sale by their parent petroleum companies Esso Resources Canada Limited and Crows Nest.

Industrial mineral programs were directed principally toward gypsum, barite and phosphate (with emphasis on rare earth content).

As in 1989 prospectors led the way in finding new prospects and developing exploration concepts in the Kootenay District.

TRENDS AND OPPORTUNITIES

Though the northwest of the province has been the focus of recent exploration activity, spurred on by discoveries such as Eskay Creek and at Tulsequah Chief, the cost of exploration is reportedly 2 to 2.5 times less expensive in areas of good infrastructure such as the Kootenays. In 1991 the release of data for the 1990 Regional Geochem Survey of map sheets 82G and 82J, and the release of gold and 25 other previously undetermined elements from archived stream-sediment pulps for map sheets 82E, F, K, M, and L will give explorationists an opportunity to get the best "bang for their buck" in the Kootenay District.

The district is also excellent hunting ground for industrial minerals. Over the last few years good prospects with respectable tonnage potential have been found for barite, gypsum, wollastonite and magnesite. In some cases the mineral occurrence was locally known. The new Mineral Act facilitates exploration and development of industrial mineral properties.

TRENDS IN THE EAST KOOTENAYS

In the East Kootenays metal exploration activity increased for the third year in a row. General areas of activity include the Cranbrook-Yahk area, the east margin of the Rocky Mountain trench and Creston.

CRANBROOK-YAHK AREA

In the Cranbrook-Yahk area exploration was directed toward the following:

- Base metal "sedex" (Sullivan-type) targets in the Aldridge Formation (*e.g.* **McNeil, Eng, Star, Bar** properties).
- Base metal veins (the **Vine**, its northwest extension and the southeast extension of the past-producing **St. Eugene** mine).
- Gold mineralization associated with generally north-northeast to northeast-trending faults. Associated with these faults are mineralized shears and dilatant zones plugged by quartz, breccias and, occasionally, altered felsic intrusions (**Bar, David/Lew, Price** properties).

Though the Sullivan time-horizon is still the principal target for sedex exploration, the thousand metres of overlying stratigraphy is receiving some attention, based on the presence of thin sulphide bands, disseminated mineralization and Sullivan-type features such as tourmalinite and fragmental zones. Exploration work is facilitated by better knowledge and correlation of thin turbidite marker horizons in the Aldridge Formation. Initial intersections of quartz sulphides on the Star property by Barkhor Resources Inc. at "Munroe marker

time" provided the impetus for exploration on surrounding properties. Some explorationists perceive there is a relationship between Moyie dikes and sills, structurally controlled vein deposits and stratabound sulphides.

Rocky Mountain Trench and East

Exploration in this area included drilling the peripheries of past-producing vein deposits in the Aldridge Formation (**Estella**, **Bull River**) and assessing the potential of old and new prospects related to monzonitic-syenitic intrusives within and east of the Rocky Mountain Trench (*e.g.* **Cash** property). The petrology of the intrusions within and east of the trench is not well known.

Creston Area

Exploration in the Creston area focused on stratabound targets in the Middle Proterozoic Aldridge Formation (**Sullivan Two** property) and in the Upper Proterozoic Dutch Creek Formation (**Wilds Creek** property).

OPPORTUNITIES IN THE EAST KOOTENAYS

The combination of deep-seated faults and intrusive activity appears to provide good prospective ground in the East Kootenays.

Upper Proterozoic rocks on the west margin of the Purcell anticlinorium have some potential for sedex deposits based on volcanic horizons, intervals of black shale and the stratigraphic proximity of exhalative minerals such as barite in the stratigraphic section (Mt. Nelson Formation).

TRENDS IN THE WEST KOOTENAYS

Nelson-Salmo-Rossland Area

Exploration activity in the Nelson-Salmo-Rossland area remained high. Efforts were focused on shear-related gold in the Elise Formation volcanic-intrusive suite, precious and base metal veins in the larger stratigraphic package of Jurassic volcanics and sediments, and alkaline porphyry copper-gold potential in dioritic to monzonitic intrusions within the Rossland Group.

Exploration continued on several intrusive-hosted gold-bearing quartz veins in the area. These included the **Alpine** of Cove Resources Corporation and the **Nevada Royal Canadian** of Winchester Developments. These gold-quartz veins interestingly also carry some scheelite together with carbonate and pyrite.

Some common denominators are appearing in the search for alkaline porphyry gold-copper (**Kena**, **Star-Eureka**, **Katie**). These include:

- Fracture-controlled chalcopyrite-pyrite-magnetite mineralization;
- Zones of propylitization (carbonate-epidote-chlorite);
- Local areas of potassic alteration and development of potassium-feldspar;
- Mineralization both in intermediate intrusives and spatially related volcanics;
- Minor associated lead-zinc mineralization.

Greenwood Area

Interest in the Greenwood area increased in 1990 and there was significant staking based on activity immediately south of the international border. Work focused on finding gold-bearing skarns near known copper-skarn prospects and past producers. There were also programs investigating the listwanite-gold association and precious metal mineralization associated with quartz veins and Tertiary gravity faults.

The discovery of a gold-bearing skarn in Knob Hill Group oceanic rocks (**Buckhorn** deposit) in Washington state is providing impetus for staking similar age rocks on the Canadian side of the border as well as re-evaluation of the known Triassic copper skarns (*e.g.* Phoenix) for the presence of gold halos.

Listwanite-related targets were basically of two types. In the first, gold bearing quartz veins which are spatially associated with serpentinites contain erratic but occasional spectacular pockets of precious metal mineralization (*e.g.* **Velvet**, **Skylark**, **Midnight**, **Golden Crown**). In the second, pervasively altered country rocks are prospective for precious metal bearing zones (*e.g.* **Rainbow - Tam O'Shanter**, **Silver Dawn**).

OPPORTUNITIES IN THE WEST KOOTENAYS

Historically the area is known for its vein deposits. Old prospects should be re-examined in the light of new ideas. Some of the old showings may in fact represent parts of larger systems such as skarns, stockworks or porphyries. More attention needs to be paid to the potential for low-grade, large-tonnage stratabound deposits which may have been overlooked given the focus on veins.

According to Bill Howard and other prospectors, outliers of the Rossland Group within Nelson plutonic

suite are not mapped in some areas including southeast of Castlegar. If true, these areas are prospective for deposits similar to the **Tillicum** or **Willa**.

In the Nelson area the **Silver King** shear zone appears to persist into the Nelson pseudodiorite making the area to the northwest prospective ground.

The Rossland camp should be assessed for its gold skarn potential given that the veins of the Rossland camp were associated with some skarn minerals. Recent petrographic studies of gold-bearing (5.31 g/t) alteration zones from the **Rossland claims** of Antelope Resources Inc. confirm skarn features such as development of garnet.

In the Nelson area prospectors have identified a number of zones of intense silica flooding and brecciation within Nelson plutonic rocks. The alteration is quartz-carbonate-sericite with minor vugs and chalcedonic banding. Most quartz breccias are barren of sulphides, low in trace metals and areally restricted, but a few carry copper-lead-zinc mineralization with anomalous gold and are more extensive. They appear to have few counterparts in the record of mining in the area although the vuggy and crustiform quartz breccias of the **Mollie Gibson** vein, a past producer may be an analogue.

In the Slocan camp workings of high-grade zinc veins abandoned at the turn of the century may be worthy to pursue.

The Greenwood camp appears to have been neglected for copper-gold porphyry potential compared to the Nelson camp, even though it is closer to the Intermontane Belt that hosts these deposit types. Known porphyry prospects in the Greenwood camp include the **Lexington**.

MINERAL EXPLORATION

GREENWOOD AREA

Battle Mountain (Canada) Inc. has started a major re-evaluation of the immediate area of the **Phoenix** copper pit for gold. In 1990 a 135-kilometre grid was established, 3400 soil samples taken and ground magnetometer survey completed. Drilling will be conducted in 1991 under an agreement with Kettle River Resources Ltd.

On the **Silver Dawn** property (old **Imperial and Emiline** Crown grants) of Rock Creek Resources Ltd. silver-rich lenses occur within a siliceous (chalcedonic?) breccia that is intercalated with quartz-carbonate rock (listwanite?). Mineralization consists of native silver with fine-grained pyrite, galena and sphalerite. The mineralized zone is reported to be open along strike, flat lying and near surface.

On the **Rainbow** property Minnova Inc. has drilled mineralization hosted by flat-lying silicified and phyllic-altered quartz porphyry sills intercalated with carbonatized ultramafic rocks.

On the **Golden Crown** property south of the Phoenix pit, Attwood Gold Corporation did further drilling to increase existing reserves of 57 000 tonnes grading 14.21 grams per tonne gold and 0.70 per cent copper. It conducted a re-evaluation of work to date and concluded that the mineralized zone is continuous between the **Winnipeg** and Golden Crown workings.

NELSON-SALMO-ROSSLAND AREA

ROSSLAND GROUP
(Intrusive and shear related gold-copper)

On the **Player** property Formosa Resources Corporation completed 1525 metres of drilling in two areas on a northwest-trending polymetallic shear in Elise Formation volcanics. The mineralization is hosted in carbonatized and silicified tuffs and is present up to widths of 8 metres running 0.4 to 0.5 per cent copper, a few per cent combined lead and 3.12 to 6.24 grams per tonne gold. Further fill-in drilling will include testing the peripheral area of a small monzonitic intrusion.

In the adjacent **Great Western Star** property, Pacific Sentinel Gold Corporation drilled several targets a 4000-metre mineralized trend early in the year. Three of the targets (**Ron**, **Eureka**, **Star**) are copper-gold prospects hosted by altered and fractured monzonite which underlies the northwest part of the property. The **Alma N** prospect is at the monzonite-volcanic contact and consists of gold with pyrite. Drilling to the southeast, at the **Toughnut** claims, explored altered volcanics along the Silver King shear.

Noramco Mining Corporation examined the **Kena** property for alkalic porphyry copper-gold mineralization. The area is marked by sericitic and siliceous shear zones parallel to the foliation and by zones of moderate to intense fracturing. Chalcopyrite and pyrite occur principally in synvolcanic diorites and to a lesser extent in Elise Formation tuffs.

Drilling on the **Shaft** property by Noramco was generally disappointing except for one area at the contact of Silver King porphyry and adjacent tuffs where anomalous gold, lead, zinc, copper and arsenic warrant further work.

A step-out hole by Noranda Exploration Company Limited on the **Katie** property near Salmo returned a 120-metre intersection of 0.15 per cent copper and 0.16 grams per tonne gold, indicating potential for a low-

grade, large-tonnage porphyry deposit. The property is underlain by hornblende diorite, Elise Formation tuffs, agglomerate and feldspar porphyry. Alteration is variably propylitic, pyritic, silicic and potassic. The mineralogy consists of pyrite, chalcopyrite and magnetite but magnetite is not coincident with sulphides. Chalcopyrite occurs in stringers and disseminations, often with calcite or quartz. Further drilling is expected to test the extent of low-grade mineralization.

VEIN

At the southern border of Kokanee Glacier Park Cove Resources Corporation drilled the eastern extension of the **Alpine** vein and a subparallel vein, the **Gold Crown**, to the south. Immediately west of Nelson, Winchester Developments drilled the **Nevada** vein.

Quartz veins related to shears were also drilled on the **Clearwater** and **Joe** properties. One hole on the Clearwater returned 13.4 grams per tonne gold over 2.3 metres.

On the **Clubine Comstock** property on the east side of the Hall syncline, north of Salmo, Yellowjack Resources Ltd. exposed a 0.3-metre vein in trenches; the best assay ran 55 per cent lead and 2185 grams per tonne silver. This high-grade vein, hosted by the Hall Formation, will be drilled in 1991. Earlier drilling had followed a quartz vein.

On the **Rely** property, between Nelson and Castlegar, gold occurs with pyrite and pyrrhotite in erratic vein-like zones within a section of hornfelsed Archibald Formation siltstones and interbedded felsic to intermediate volcanics. Pegasus Gold Inc. drilled an induced polarization anomaly but with less encouraging results than in 1989 when up to 8.74 grams per tonne gold was intercepted over 6.1 metres.

On the **Whitewater** property, Teck Corporation drilled a breccia in Rossland Group rocks, near the contact with Nelson intrusive rocks, with inconclusive results.

In the Rossland camp Antelope Resources renewed drilling on the **Rossland claims** late in the year, focusing on the **Bluebird** and **New North** areas in the south belt. A large (62-metre) interval of lead-zinc mineralization was intersected in one hole and a narrow high-grade gold-silver zone in another (0.37 metres of 376 grams per tonne silver, 14.5 per cent lead, 7.5 per cent zinc and 10.3 grams per tonne gold). Traditional mineralization on this claim block consists of massive pyrrhotite-chalcopyrite shoots in altered monzonite and Elise Formation volcanics. Interestingly, gold occurs with arsenopyrite but not necessarily with the massive sulphide content.

Southwest of Rossland, at the **Midnight** mine, underground development continued on quartz veins and about 1500 tonnes of ore was hauled to a mill in Northport, Washington.

SKARN

North of Nancy Greene Park, in an area underlain by Mount Roberts Formation CAMECO drill-tested two areas in which trenching had exposed massive pyrite-pyrrhotite mineralization with elevated gold values in skarn.

OTHER

In the Salmo camp, Yellowjack Resources Ltd. pursued gold in Lower Paleozoic limestones and phyllites on the **Ore Hill-Summit** property. Sulphides, including sphalerite, galena, and chalcopyrite (minor), and free gold are present in crackle zones confined to the more carbonate-rich facies. Results of drilling in three holes returned values of 6.24 to 12.48 grams per tonne gold in intervals of 2 to 3 metres. Old mine workings nearby exploited a rich polymetallic quartz-siderite vein.

SLOCAN AREA (KASLO-NEW DENVER-SLOCAN)

At the **Silvana** silver-lead-zinc mine, drilling from surface and underground pursued the faulted western extension of the lode structure and tested the ground between the Silvana mine and Carnation workings without much success.

Avril Explorations Ltd. opened up, mapped and sampled levels 2, 3, 5 and 5A on the **Grey Copper** vein (a high-grade zinc vein) located near the former mining town of Cody.

Kokanee Explorations Ltd. drilled the **Hope** prospect which consists of a skarned pendant of the Slocan Group within the Nelson plutonic suite. Potential for extension of modest reserves is limited.

The **Millie Mack** property, site of an extensive program in 1989 by Dragoon Resources Ltd., underwent limited drilling without much success.

The **True Blue** massive sulphide prospect, hosted by the Upper Paleozoic Milford Group, was tested by a single hole by QPX Minerals Inc. This prospect of banded massive pyrite-pyrrhotite-chalcopyrite up to 1.2 metres thick warrants further work.

CRESTON AREA

Kokanee Explorations Ltd. drilled the **Wilds Creek** property near Wyndell, where sphalerite occurs in two apparently stratabound units within the Dutch Creek Formation. The Dutch Creek Formation consists of interbedded green, quartz phyllite, black phyllite (with magnetite) and argillaceous limestone together with a very thin volcanic unit. The sphalerite occurs with coarse-banded pyrite.

West of Creston, White Knight Resources Ltd. explored bedded sulphide zones in metamorphosed Aldridge rocks on the **Sullivan Two** property.

CRANBROOK-YAHK AREA

Kokanee Explorations Ltd.'s **Vine** occurrence near Cranbrook has been tested for 375 metres along strike and for a depth of 800 metres. Polymetallic mineralization in a siliceous and/or calcitic gangue occurs in veins, primarily on the hangingwall and footwall of a steeply dipping gabbroic dike which occupies a northwest-trending fault. A hangingwall vein is most persistent, up to 4 metres thick but averaging 2 metres. The mineralogy is galena, sphalerite, pyrrhotite, pyrite and gold-bearing arsenopyrite. Drilling to date totals 16 385 metres in 54 holes with three principal mineable zones having been defined. A decline and bulk sampling is planned for 1991.

On the **Price** claims Kokanee drilled quartz veins and breccias associated with a northeast-trending structure near Perry Creek.

On the **Lookout** property, operated by White Knight Resources Ltd., continuity of the Vine vein structure to the northwest was established. Lead,-zinc-silver-gold mineralization was found to be irregular due to the presence of a gabbro dike within the structure. The structure is believed to be the faulted northwest extension of the Vine occurrence.

On the **Star** property of Barkhor Resources Inc., sulphides (galena, sphalerite, pyrrhotite, chalcopyrite) are enclosed in coarse quartz bands. Some suggestion of contorted sulphide bands is present and some quartz bands are quite continuous. Sulphides are also associated with more erratic quartz veining. Nine drillholes of about 300 metres each have been completed. The property has large areas of alteration (tourmalinization) and the style of mineralization is not yet well understood.

A deep hole was drilled on the **Bar** property of Goldpac Investments Ltd. to intersect the Sullivan time-horizon within the favorable mineral trend known as the "Sullivan corridor". The 1900-metre hole intersected a large gabbroic body.

On the **Bar** property near Cranbrook, Swift Minerals Ltd. intersected 37.82 metres of copper mineralization (0.2 to 0.54% range) with anomalous gold in four intervals over a length of 129.3 metres. Hostrocks include two syenite dikes separated by a quartz and quartz-breccia zone that occupy a zone of dilation along the Cranbrook fault. Drilling was conducted at the north end of previous drilling by Chapleau Resources Ltd. in 1988.

Bapty Research Ltd. drilled a gold-bearing shear with quartz on the **David/Lew** property. Shearing may be related to the nearby Old Baldy fault. Values of 6.24 grams per tonne gold across 2.4 metres are reported for a tested strike length of 150 metres.

ROCKY MOUNTAIN TRENCH AND EAST

On the east side of the Rocky Mountain Trench, at the site of the **Bull River mine**, the R.H. Stanfield Group drilled a copper vein-system southeast of previous surface workings. The veins, including mineralized quartz-carbonate breccias, are 1 to 3 metres wide and are enclosed in prospective shear envelopes of up to 10 metres in width. The principal sulphide is disseminated chalcopyrite but the veins carry minor silver and an undefined amount of gold. A minimum drill-indicated reserve of two million tonnes is quoted at an undisclosed grade.

Near the east fork of the **Wildhorse River**, Kokanee Explorations Ltd. explored copper-skarn mineralization at the contact of a small monzonitic plug and lead-zinc in nearby Cambrian Jubilee Formation brecciated limestone.

In the south, near the United States border at Roosville, Teck reports that drilling at the **Roo** property, a redbed copper prospect in the Proterozoic Sheppard Formation was inconclusive. Anomalous silver values remain unexplained.

Drilling at the **Estella mine** suggests graphitic Aldridge rocks may be responsible for the geophysical anomalies.

COAL

Coal exploration programs were conducted at **Line Creek** and **Fording River** operations and **Coal Mountain**.

At **Line Creek** exploration drilling was conducted at Horseshoe Ridge, Mine Services Area North, and 3-4 seam area. Exploration became focused on Mine Services Area North, straddling the north boundary of Mine Lease 4. A coal seam 30 metres thick occurs in a low strip ratio setting. Drilling continued into late fall.

At **Coal Mountain**, Byron Creek Collieries completed 57 rotary-drill holes in the Corbin area, adjacent to its active pit. Reserves were increased, principally due

to a structurally thickened 30-metre seam which has weak coking-coal properties. Exploration and development work will continue in 1991 and the paperwork for extending the mine lease has started.

At **Fording Coal** further drilling in the Lower Henretta valley brought this area one step closer to mine development. Drilling in Taylor pit defined the base of coals against a basal thrust. South of the mine area, drilling confirmed a coal resource on Castle Mountain. To the west, in the area of the Greenhills syncline at Lake Mountain, drilling and bulk sampling was conducted in preparation for a dragline mining operation in 1992.

The area of the Fernie basin has attracted attention from oil and gas companies investigating its potential for coalbed methane generation. Basic research and background engineering studies are being conducted.

INDUSTRIAL MINERALS

Domtar Inc. drilled its south quarry which is scheduled for gypsum production in 1991 and drill-tested a new area north of the northern quarry (**Four J, Two-T**). Mountain Minerals Co. Ltd. put in an exploration adit and bulk sampled a fault-controlled barite deposit at the **Surelock** property.

Formosa Resources Corporation located additional phosphate prospects in the basal Fernie Formation on the **Barnes** property.

OPERATING MINES

The **Sullivan mine** closed in January but reopened November 1 after 2.5 months of development work. The mine has an expected life of 8 years and annual production is expected to be 2 million short tons.

Byron Creek Collieries increased production to 1.6 million tonnes but was put up for sale by Esso Resources. Toward the end of the year the **Line Creek mine** was also on the auction block.

At the **Silvana mine** about 3050 metres of development drilling was completed. Total reserves (including pillars) in July 1990 stood at about 41 000 tonnes running 356 grams per tonne silver, 4.1 per cent lead and 5.1 per cent zinc. Additional tonnage is available from the **Hinckley mine** but at a lower ratio of silver to lead and zinc.

Westroc Industries Ltd. plans to deplete its gypsum reserves at the **Windermere** 3 quarry and switch back to the **Elkhorn 1** quarry which was the site of operations before 1989. An adjacent pit, **Elkhorn 2** is scheduled for production later. Westroc mines about 410 000 tonnes of gypsum annually.

About 150 000 tonnes of silica was mined in the Kootenay District in 1990. Silica for silicon metal is mined at Nicholson south of Golden by Bert Miller Contracting Ltd. while silica sand from a friable quartz sandstone is mined by Mountain Minerals just north of Golden. Silica for the Cominco smelter at Trail comes from a quarry south of Salmo, operated by 331670 B.C. Ltd.

Over 170 000 tonnes of high grade magnesite was produced at the world-class **Mount Brussilof** deposit of Baymag Mines Ltd.

At the **Moyie River placer operations** of Queenstake Resources Ltd., 37 631 cubic metres of gravel were processed which yielded roughly 52 kilograms of fine gold.

TABLE 5-1
OPERATING MINES IN KOOTENAY DISTRICT, 1990

MINE (OWNER)	TONNES MILLED (000S)	RATED CAPACITY (TPD)	%ANNUAL RATED CAPACITY	DEPOSIT TYPE	RESERVES/PRODUCTION
Line Creek (Crows Nest Res. Ltd.)	2 072	10 400	55	Coal	Production: 1.8 Mt metallurgical and thermal coal
Balmer (Wester Mining Ltd.)	5 939	26 000	68	Coal	Production: 5.4 Mt metallurgical coal, 200 kt thermal coal
Coal Mountain (Byron Creek Collieries)	1 587	4 930	57	Coal	Production: 1.6 Mt thermal coal
Greenhills (Westar Mining Ltd.)	3 032	9 900	85	Coal	Production: 2.7 Mt metallurgical coal
Fording River (Fording Coal Ltd.)	6 860	15 900	104	Coal	Production: 5.0 Mt metallurgical coal, 0.9 Mt thermal coal
Sullivan (Cominco Ltd.)	460	8 000	76	Sedex Zn-Pb-Ag	Reserves: 23 Mt @ 7.1% Zn, 4.6% Pb, 29 g/t Ag
Silvana (Treminco Res. Ltd.)	34.6	110	84	Vein Ag-Pb-Zn-Cd	Reserves: 41 kt including pillars @ 356 g/t Ag, 4.1% Pb, 5.1% Zn
Mt. Brussilof (Baymag Mines Ltd.)				Replacement	Production: 170 kt magnesite
Lussier River (Domtar Gypsum Inc.)				Evaporite	Production: 135 kt gypsum
Moberley Silica				Sedimentary	Production: 90 kt silica
Parson (Mountain Minerals Co. Ltd.)				Vein	Production of Barite N/A
Nicholson (Bert Miller Contracting Ltd.)				Sedimentary	Production: 36 kt silica
Crawford Bay (IMASCO)				Sedimentary	Production: 32-36 kt dolomite
Sirdar Granite (IMASCO)				Granite	Production: 2.8 kt granite
Lost Creek (IMASCO)				Sedimentary	Production: 6-7 kt limestone
Salmo Quartzite (Kootenay Stone Centre)				Sedimentary	Production: Several thousand tonnes flagstone from 3 quarries
Queenstake Moyie River (Queenstake Res. Ltd.)				Placer Au	Production: 52 kg fine Au from 37 631 cubic metres of gravel
Windermere (Westroc Industries Ltd.)				Evaporite	Production: 410 kt gypsum

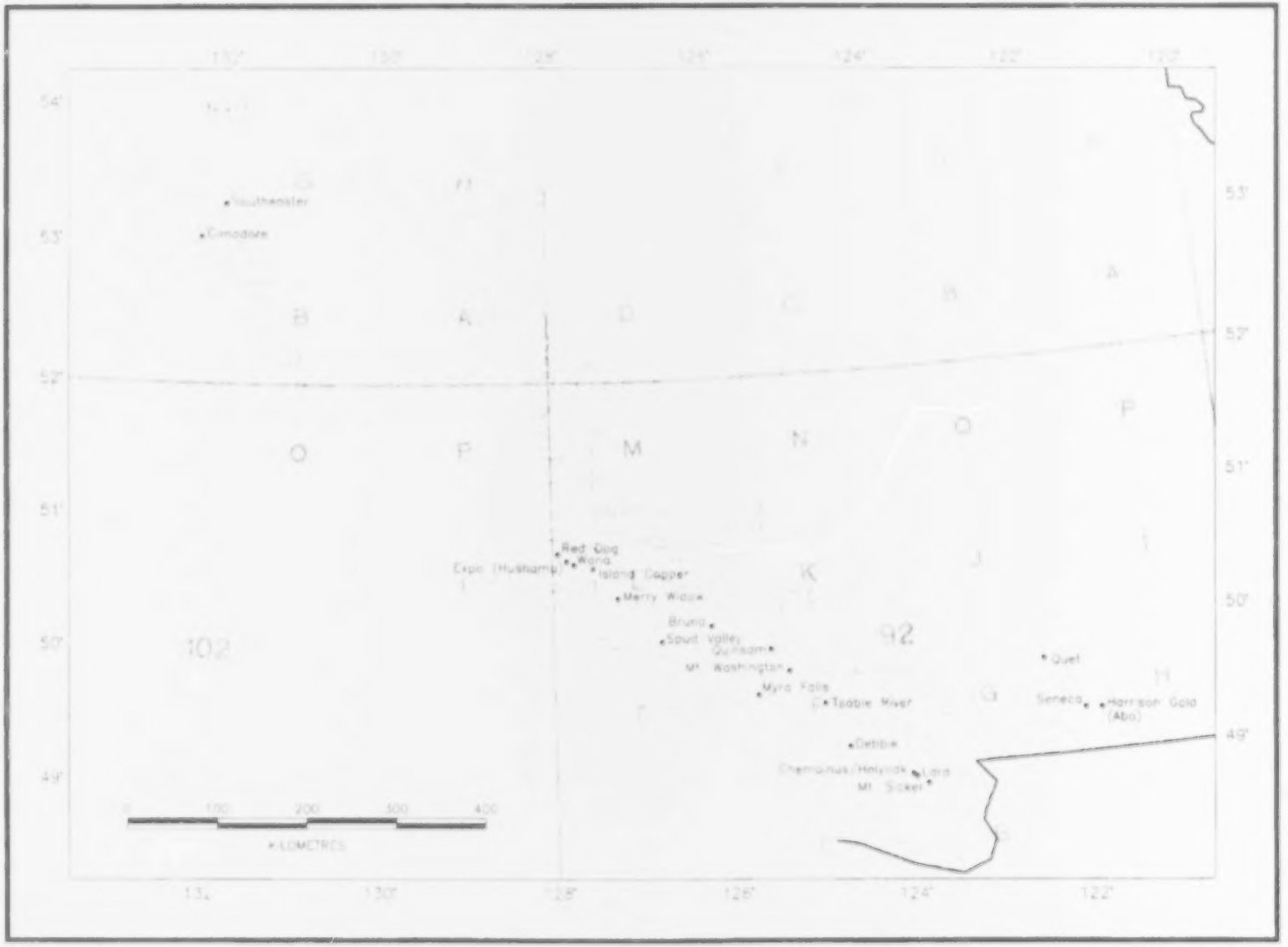
Youtheaster
Comodore
Red Gold
Wara
Expo (Hushamu)
Island Copper
Merry Widow
Bruce
Spud Valley
Quiltsam
Mt. Washington
Myra Falls
Tbable River
Debbie
Chemainus/Holyoke
Mt. Sicker
Lara
Quet
Seneca
Harrison Gold (Abo)
102
92
A
B
C
D
E
F
G
H
J
K
L
M
N
O
P
54°
53°
52°
51°
50°
49°
55°
132°
130°
128°
126°
124°
122°
0
100
200
300
400
KILOMETRES

Figure 6-1

SOUTHWESTERN DISTRICT

By H.P. Wilton and S.N. Pfuetzenreuter
District Geology, Victoria

INTRODUCTION

A reduction in the level of exploration activity in the Southwestern District, which began in 1989, accelerated significantly in 1990 and appears likely to continue into 1991. To the end of October, the total number of Notices of Work filed in 1990 was down by approximately 15 per cent compared to the same period in 1989. More specifically, notices on mineral properties were down by 13 per cent while placer notices dropped by 82 per cent. The pace of activity was significantly reduced on Vancouver Island, particularly in the Victoria Mining Division, and showed a major reduction on the Queen Charlotte Islands. In contrast, activity as measured by the number of active projects, showed a slight increase in the southwestern mainland part of the district. However, most of those projects had small, low-budget programs. The total number of advanced exploration projects in the district, defined as those which involved drilling or underground exploration (*see* Table 1-3), was down by exactly 50 per cent from the number in 1989. Of those advanced projects which were active in 1990, several were operating with reduced budgets compared to previous seasons. Only three companies (Minnova Inc. at the Lara project, Falconbridge Limited at Chemainus and Moraga Resources Limited west of Port Hardy) spent close to or slightly more than $1 million on projects in the district. In the case of Moraga, the expenditure was divided among several separate properties. There were no project expenditures in excess of $1 million.

The main focus of exploration interest was on the porphyry copper camp west of Island Copper on northern Vancouver Island where Moraga Resources Limited, and several affiliated junior companies, drilled three properties and carried out preliminary programs on several others. Near Chemainus, both Minnova Inc. and Falconbridge Limited again completed major drilling programs searching for volcanogenic massive sulphides in the Sicker Group. Potentially important late-season drilling programs are underway at the **Merry Widow** gold-copper skarn prospect, optioned by Noranda Exploration Company, Limited from Taywin Resources Ltd., and on the **Tsable River coal licences** where Western Canadian Mining Corporation is the operator. Other properties with potential for generating interest in 1991 include the **Quet** gold and base metal property north of Harrison Lake, optioned by Noranda from Aranlee Resources Ltd.; the **Seneca** volcanogenic massive sulphide prospect on the Chehalis River where Minnova Inc. is attempting to mount a late-season drilling program; the **Ladner Creek** project where Anglo Swiss Mining Corporation hopes to increase reserves at the former Carolin mine; and the **Southeaster** gold prospect of Worthington Resources Corporation on Graham Island.

Several advanced properties at which gold is the main or only significant commodity saw limited exploration programs, or none at all, as both major and junior companies found it increasingly difficult to raise exploration funding for exclusively precious metal projects. Among those properties were **Spud Valley**, **Debbie**, and **Mount Washington**.

The three operating mines in the southwestern district continued full-scale operation through 1990. Westmin Mines Limited at **Buttle Lake** and BHP-Utah Mines Ltd. at the **Island Copper mine** both maintained large-budget exploration programs in an attempt to increase the lives of their respective mines beyond the end of the century. The **Quinsam thermal coal mine** of Brinco Coal Corporation made or initiated several operating improvements, including a test underground operation, in 1990 and appears to be an increasingly healthy producing mine.

MINERAL EXPLORATION

VANCOUVER ISLAND

The project on Vancouver island where most interest was focused in 1990 is the **Expo** property optioned by Moraga Resources Ltd. from BHP-Utah Mines Ltd., operator of the nearby Island Copper mine. The **Hushamu** porphyry copper-gold deposit on the Expo property, located 26 kilometres west of the Island Copper mine, had, prior to Moraga's current program, published reserves of 52.2 million tonnes grading 0.32 per cent copper, 0.008 per cent molybdenum, and 0.41 gram per tonne gold, with a further geological inventory of 159 million tonnes of similar grade. Moraga's objective was to improve the measured reserves and to demonstrate the existence of a mineable deposit in the Hushamu zone with a stripping ratio more favorable than the 2.2:1 previously

calculated by BHP-Utah Mines. By year-end Moraga had completed approximately 20 drill holes totalling more than 4200 metres with, drilling expected to continue into the New Year. Moraga's most recent published estimate of indicated reserves is 79 million tonnes at 0.30 per cent copper, 0.023 per cent molybdenum and 0.34 grams per tonne gold, at a stripping ratio of 0.8:1 and with a possible total resource inventory of as much as 414 million tonnes in the Hushamu zone.

In addition to the major drilling program on the Expo property, Moraga drilled 10 holes totalling 1890 metres at the adjacent **Red Dog** property located near Holberg and optioned from Crew Natural Resources Ltd. The 1990 drilling confirmed previously estimated reserves of 45.4 million tonnes grading 0.32 per cent copper and 0.41 gram per tonne gold, with an exceptionally favorable stripping ratio of 0.36:1. Moraga also completed a drilling program consisting of 17 reverse-circulation holes totalling 1867 metres on the **Wann** property optioned from Acheron Resources Ltd. and located in the Wanokana Creek area west of Coal Harbour. This preliminary program tested several anomalous zones and intersected encouraging alteration assemblages but, so far, no ore-grade mineralization. Elsewhere in the northern Vancouver Island copper belt, Moraga Resources and several affiliated junior companies, as well as major companies including Placer Dome Inc., completed reconnaissance-scale programs on a large number of claim groups, in many cases following up on anomalous results from the 1989 Regional Geochemical Survey release.

The only other concentration of large-budget drilling programs on Vancouver Island was in the Chemainus River area at the eastern end of the Cowichan uplift of Sicker Group rocks. Both Minnova Inc. and Falconbridge Limited completed major drilling programs there in the ongoing search for additional volcanogenic massive sulphide mineralization in Paleozoic felsic volcanics. At the **Lara** property, which is owned by Laramide Resources Ltd., Minnova drilled a total of 11 167 metres in 49 holes, mainly to test anomalous zones away from the previously explored Coronation zone. Minnova also drilled 14 holes totalling 2400 metres on the separate, wholly-owned **Mount Sicker** property. Falconbridge drilled a total of 7202 metres in 24 holes on its **Chemainus - Holyoak** property, which adjoins both the east and west sides of the Lara property, and provides potential targets on strike with the Coronation zone and the former producers on Mount Sicker. No results have yet been released for any of these Chemainus-area projects.

The only other advanced project in the Sicker belt of southern Vancouver Island was the **Debbie** project of Westmin Resources Limited on McLaughlin Ridge southeast of Port Alberni. This large property with three significant mineralized zones, all involving epigenetic, shear and vein-related gold mineralization, had attracted considerable attention in recent years as the flagship for new styles of mineralization in the Sicker belt. In 1990 Westmin mounted a program with a much-reduced budget. The only drilling involved four short holes to test a new gold zone west of the high-grade 900 zone. The junior joint venture partner, Pacific Gold Corporation (formerly Nexus Resources), did not participate in the 1990 program and did no work on its self-managed **Yellow** claim.

At the end of 1989 McAdam Resources Inc. seemed well on its way to developing a new gold producer at its **Spud Valley** property in the Zeballos gold camp. Early in 1990, underground drifting and sampling was in progress and was feeding bulk-sample material to a newly opened pilot mill on the property. Unfortunately, the head grade to the mill was only a small fraction of the average ore grade, apparently due to severe dilution in the mining process. The company reported that gold produced from the mill was insufficient to pay for continued mining. By mid-year the exploration budget, financed mainly by an associated company, McNickel Inc., had been exhausted, McAdam Resources was in financial difficulty, and all work on the property ceased.

Another highlight property in 1989 was the **Merry Widow** skarn-related gold-copper prospect of Taywin Resources Ltd. near Benson Lake. In September of 1990, it was announced that Noranda Exploration Company Limited had signed an otion agreement with Taywin granting it an option to earn 51 per cent interest by spending $1.5 million in two years. Late in the year, a Noranda crew completed mapping, geophysics and geochemistry over most of a 20-kilometre grid and, early in December, began drill-testing several promising geophysical/geological targets.

Other advanced mineral exploration properties on Vancouver Island which received some work in 1990 included the **Mount Washington** epithermal gold prospect where Better Resources Ltd. drilled six holes totalling 284 metres to test the southward extent of the **Lakeview** gold-silver-copper deposit, and the **Bruno** property of Doromin Resources Ltd. in the White River area south of Sayward, where 11 holes totalling 1400 metres were drilled to test a fault-related copper-bearing quartz vein in suspected Paleozoic volcanic rocks.

Southwestern Mainland

Although the total number of Notices of Work from the southwestern mainland part of the district was marginally higher than in 1989, advanced projects and highlights were few. The highlight project in 1989 was the **Giant Copper** prospect of Bethlehem Resources Corporation southeast of Hope. The project was essentially

dormant in 1990 as the company waited for some political resolution of the status of Skagit Recreation Area where an essential portion of the mineral resource inventory of the property is reported to occur.

The most intriguing, and potentially most interesting, new development was at the **Quet** property of Aranlee Resources Ltd., located on Sloquet Creek northwest of Harrison Lake. Noranda Exploration Company Limited optioned the property from Aranlee and, after completing extensive surface surveys, drilled a fence of seven holes totalling 1252 metres, to test stratabound mineralization in a felsic fragmental unit of the Fire Lake volcanics. The mineralized zone, characterized by coincident induced polarization and strong multi-element soil geochemical anomalies, is believed to be a result of intense hydrothermal alteration and veining of a receptive horizon, rather than syngenetic mineralization as originally believed. The drilling results were encouraging and indicate potential for a large-tonnage, low-grade precious metal deposit. At the **Harrison Gold** project of Bema Gold Corporation and Abo Resources Corporation near Harrison Hot Springs, Bema drilled a total of 2106 metres in seven holes to evaluate the gold potential of the Hill stock and a nearby hydrothermal breccia body. A separate deposit on the property, confined to the Jenner quartz diorite stock, had previously been determined to contain indicated and inferred reserves totalling 2.2 million tonnes grading 4.1 grams per tonne gold. Assays reported from the 1990 drilling were substantially below the average grade of the Jenner deposit, but Bema has not yet commented on the overall results of the 1990 program.

Minnova Inc., which had been systematically exploring volcanogenic massive sulphide potential throughout the Britannia volcanic belt for several years, was not active in that area in 1990. However, it did option the **Seneca** property on the Chehalis River near Harrison Lake from International Curator Resources Ltd. and Chevron Minerals Ltd., the target being massive sulphides in Harrison Lake Formation volcanics. After reviewing existing data and completing limited surface surveys, Minnova began a drilling program late in the year. At Ladner Creek northeast of Hope, Anglo Swiss Mining Corporation expects to resume underground drilling at the **Idaho zone** of the former **Carolin mine** in order to improve on the present underground mineral inventory of 898 000 tonnes containing 4.3 grams per tonne gold. Earlier in the year the company completed a trenching program at the **McMaster zone**, located 1 kilometre north of the Idaho zone, where drilling in 1989 produced very encouraging results.

QUEEN CHARLOTTE ISLANDS

The year 1990 saw a major reduction in the number of Notices of Work received for properties on the Queen Charlotte Islands, indicating a continued decline in exploration interest in this politically sensitive area. The highlight property on the islands in the previous decade was the **Cinola** property with a measured reserve of 24.8 million tonnes of low-grade gold mineralization. In May of 1990, City Resources (Canada) Corporation announced that the latest feasibility study had indicated that the deposit was uneconomic at current gold prices and no further work would be done to develop a mine at Cinola in the foreseeable future. In spite of that negative development, Worthington Resources Corporation remains optimistic about the potential of its **Southeaster** epithermal gold prospect near Skidegate. An aggressive program consisting of 18 holes totalling 940 metres, plus trenching of newly discovered zones, was completed early in the year. Erratic but locally high-grade gold values were intersected in quartz veins and siliceous breccias associated with a regional fault system parallel to the major Sandspit fault which controls the mineralization at Cinola.

At the **Cimadoro** massive sulphide prospect of Doromin Resources Limited on Deena Creek, northern Moresby Island, Teck Corporation dropped its option after failing to locate additional mineralization in a drilling program in late 1989. Doromin Resources then drilled nine short holes in the vicinity of the original surface showing and reported several narrow intervals of good-grade polymetallic mineralization. The surface showings consist of lenses of sheared lead-zinc-silver sulphides with minor gold, copper and locally high barium in a package of cherts, argillites and limestones which appears to underlie the Karmutsen formation. There are also layers of cherty siltstone in the section which contain finely disseminated pyrite, sphalerite and galena with zinc assays up to 1.5 per cent. Although the geology of the deposits is still poorly understood, due to complex folding, shearing and faulting, it is the opinion of this observer that they most closely resemble sedex deposits. There is also growing evidence that the mineralization and its host stratigraphy are Paleozoic in age and may herald a new type of exploration target on the Queen Charlotte Islands. A Geological Survey of Canada mapping crew has reported the discovery of very similar stratigraphy elsewhere on northwestern Moresby Island containing Permian conodonts (*see* J. Hesthammer *et al.*, G.S.C. Current Research, Part A, Paper 91-1A).

COAL

The first Notice of Work on a coal exploration property in almost two years was filed late in 1990 by

Western Canadian Mining Corporation, a company affiliated with Consolidated Brinco Limited, owner of the Quinsam Coal mine near Campbell River. Western Canadian started drilling in December on the **Tsable River coal licences** south of Comox Lake, owned partly by Weldwood of Canada Limited and partly by Esquimalt and Nanaimo Railway Ltd. A total of 5000 metres in 28 large-diameter diamond-drill holes is planned.

INDUSTRIAL MINERALS

There were no major industrial mineral developments or exploration projects reported from the southwestern district in 1990. A new granite quarry, operated by Pacific Granistone Corp. near Squamish, is reported to have begun cutting and selling granite blocks. Near Seechelt, Tri-Sil Minerals Inc. continues to sample, test and solicit markets for wollastonite, garnet, and "black granite" from its multi-commodity industrial mineral properties.

PLACER

Placer activity in the southwestern district has become almost dormant. In 1990 only two placer notices were received, one from the **Leech River** area and the other from **Amai Inlet** on Vancouver Island. There is no reported activity anywhere on the lower Fraser River or its tributaries.

PRODUCING MINES

There are two producing metal mines and one producing coal mine in the Southwestern District and no new mines currently being developed. There are also three producing limestone quarries on Texada Island and a few claystone and marl producers on Vancouver Island and in the Fraser Valley.

At Myra Falls on Vancouver Island, Westmin Mines Limited continued production from the **H-W** and **Lynx** mines with a daily milling rate close to 3600 tonnes. Published reserves at the start of 1990, totalling all categories in all orebodies, were 12.1 million tonnes averaging 2.5 grams per tonne gold, 34.5 grams per tonne silver, 2.3 per cent copper, 0.4 per cent lead and 5.2 per cent zinc. The slow and expensive process of exploring underground for new reserves continued through 1990 with an exploration budget reported to be $7.8 million. Several potentially significant new massive sulphide zones throughout the mine lease are being evaluated.

BHP-Utah Mines Ltd. continued to mine and mill ore at a rate of approximately 50 000 tonnes per day from its **Island Copper** porphyry copper-gold-molybdenum deposit at Rupert Inlet near Port Hardy. Current recoverable reserves are estimated to be sufficient to maintain production until late 1996 or early 1997. Meanwhile exploration drilling of several possible sources of additional reserves on the mine property is continuing, with a 1990 exploration budget of approximately $700 000.

At Middle Quinsam Lake near Campbell River, Brinco Coal Corporation operates the **Quinsam** open-pit coal mine with an anticipated total production in 1990 of 250 000 tonnes of thermal coal. A test underground mining operation in 1990 is considered to have been quite successful and the company is hoping to soon double its annual production by opening an underground mine while maintaining steady production from the open pit. Reserve estimates at the Quinsam mine were reported in mid-1990 to consist of 23.3 million tonnes of surface-mineable coal and 19.9 million tonnes of underground reserves.

1990-91 BRITISH COLUMBIA PROSPECTORS ASSISTANCE PROGRAM

By J. Pardy, Prospectors Assistance Program

INTRODUCTION

The 1990-91 British Columbia Prospectors Assistance Program is a $500 000 one-year program to promote prospecting activity in the province by providing training, financial and technical assistance to prospectors. Financial assistance is available through the prospector grant program which is designed to provide part of the risk capital required by prospectors in their search for mineral deposits. Sound, well-conceived prospecting programs are supported with grants up to a maximum of $7500 per year. Prospecting targets eligible for assistance include lode and placer deposits of metallic and industrial minerals (except sand and gravel), and coal deposits. Prospectors have access to technical assistance in the field from Ministry personnel active throughout the province. Training consists of the delivery or support of three levels of courses: introductory level courses, the annual Advanced Prospecting Course and the highest level course, Petrology For Prospectors.

FINANCIAL ASSISTANCE

For the 1990-91 program, applications received by April 6, 1990 were considered for the initial allotment of grant funds. Grants were awarded as follows (Figures 7-1, 2):

Applications received	174
Grants awarded	86
Maximum grant	$7500
Average grant	$4884

Fifty per cent of the grant awarded is payable on approval of the applications, with the remainder on receipt of a satisfactory prospecting report by January 31, 1991. Grantee prospectors are required to submit a prospecting report consisting of two parts: part A, a summary of prospecting activities and expenditures and part B, a technical report of activities. Final payment of the grant is made upon approval of the report. The technical reports received are released to the public domain after a 5-year confidentiality period.

A total of 161 prospecting programs were proposed by the 86 grantee prospectors. Only the most significant of these were used to plot the 136 locations on Figure 7-3.

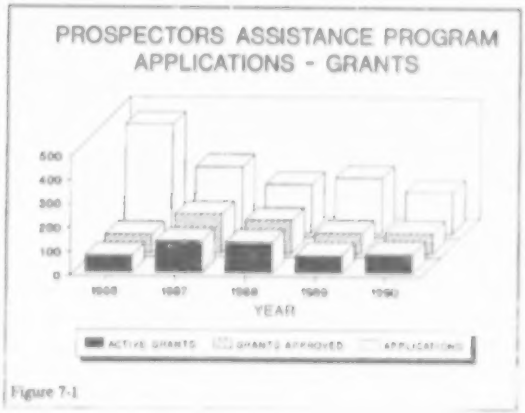

Figure 7-1

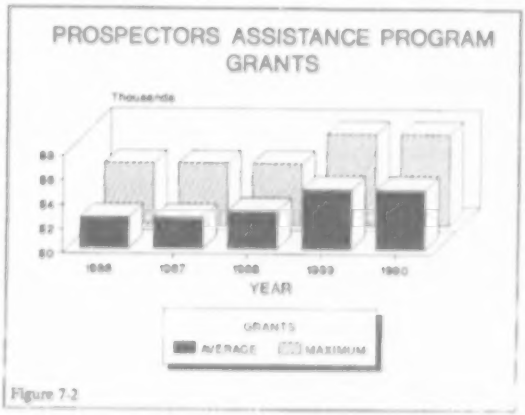

Figure 7-2

The remaining 25 programs were not plotted because they were less significant in scope or duration.

Most of the assisted programs are concentrated in areas of active exploration and good access (Figure 7-3) and are fairly evenly distributed in the geologically significant areas of the southern two-thirds of the province. The gradual northward shift in the location of assisted programs that started in 1988-89 has continued through to this year.

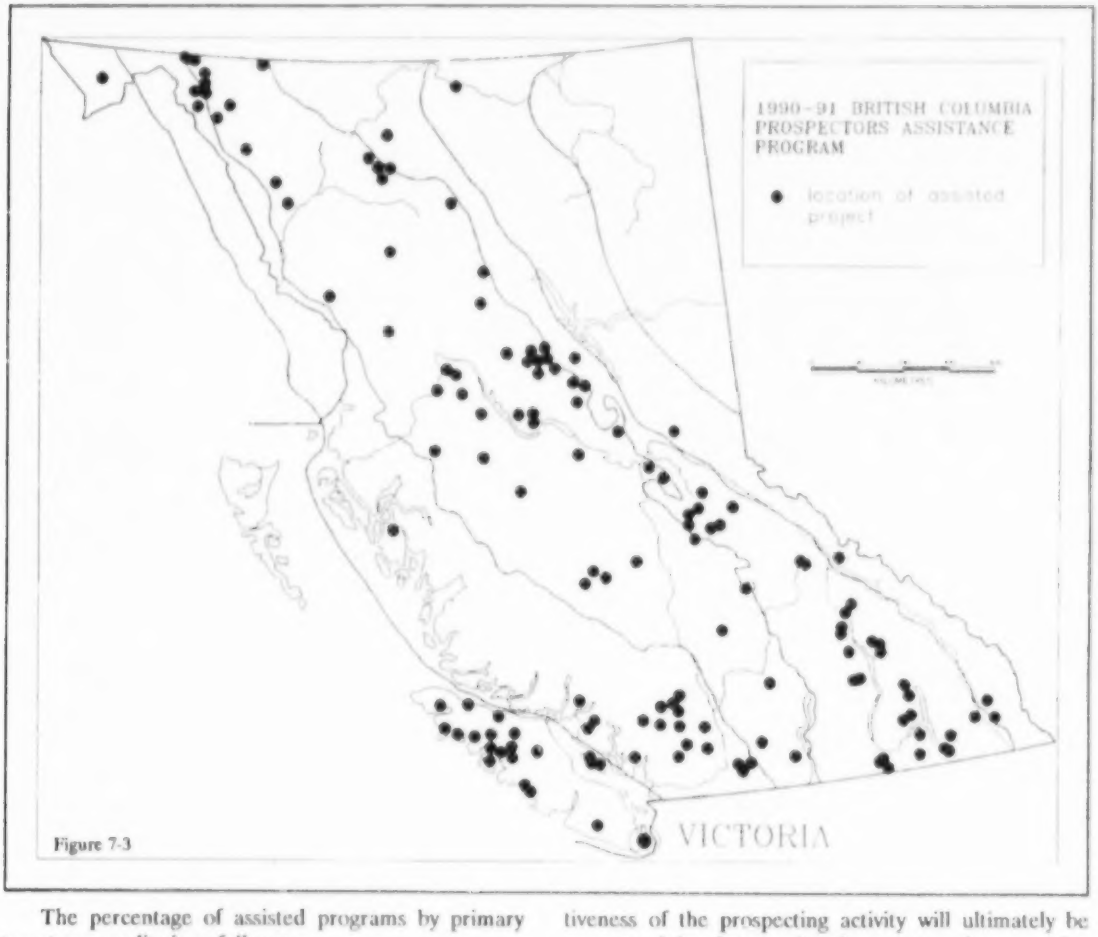

Figure 7-3

The percentage of assisted programs by primary target commodity is as follows:

Industrial minerals	2%
Base metals	3%
Placer gold	7%
Precious metals	28%
Base/precious metals	60%

Changes in primary target commodity from the 1989-90 program include decreases in placer gold projects (9 % to 7%), hard-rock precious metal projects (39 % to 28 %), base metal projects (4 %to 3 %) and industrial mineral projects (9 % to 2 %) and an increase in base/precious metal projects (39 %to 60%). The trend over the past several years has been a significant reduction in the number of precious metal projects and an increase in base/precious metal projects.

Each year the prospecting activity under the grant program generates prospects that warrant further exploration. These prospects are optioned by mining or mineral exploration companies which carry out larger and more expensive exploration programs that usually are beyond the means of individual prospectors. The effectiveness of the prospecting activity will ultimately be measured by future developments of properties generated under the program. The cumulative value of work commitments made by exploration companies on mineral prospects worked on under the grant program always exceeds the total value of funds committed to grants.

One of the most significant prospects generated by grantees is the Fireweed silver-lead-zinc-copper-gold occurrence located on the west side of Babine Lake. Disseminated sulphides, massive sulphides and sulphides in breccia zones occur in sedimentary rocks thought to belong to the Cretaceous Skeena Group. Mineralized outcrops were discovered in 1987 after following up float containing anomalous gold and the property was subsequently optioned by Mansfield Minerals (formerly Canadian United Minerals Inc.). In excess of $1 million was spent on the property and interesting targets have been defined by ground surveys and drilling. Minnova Inc. has recently optioned the property from Mansfield Minerals and plans to conduct additional ground surveys and complete further drilling.

Under the 1988-89 program prospector Charles Kowall discovered significant gold-silver mineralization on Willoughby Creek east of Stewart and optioned the property to Bond International Gold Inc. The company subsequently acquired additional claims and conducted an exploration program which resulted in a drill intersection of 20.5 metres averaging 24.98 grams per tonne gold and 184.21 grams per tonne silver at the Willoughby gossan and a drill intersection of 66 metres averaging 9.88 grams per tonne silver and 49.29 grams grams per tonne silver 6 kilometres west of Red Mountain. Further work was conducted by the company in the 1990 exploration season.

TRAINING

Introductory prospecting courses, offered in British Columbia on an annual or fairly regularly scheduled basis, are sponsored by the Ministry of Energy, Mines and Petroleum Resources, the British Columbia & Yukon Chamber of Mines, the Chamber of Mines of Eastern British Columbia, community colleges and prospector associations. Most of these courses are delivered through community college facilities. The Prospectors Assistance Program sponsors a minimum of two courses annually and supports other courses through contributions and, up to this year, provided the essential learning resource of the prospecting courses by producing and selling high-quality rock and mineral sets at very reasonable cost. The British Columbia Museum of Mining now produces and sells the rock and mineral sets. Centres where courses are available annually include: Victoria, Nanaimo, Vancouver, Nelson and Smithers. Courses are less frequently offered in Prince George, Chilliwack and Kelowna. Other introductory courses are offered at selected times and locations on a cyclical or as-needed basis.

The 14th Annual Advanced Prospecting Course (APC) was successfully delivered during the period of April 24 to May 11, 1990. The fourteen sessions of the course held since 1977 have produced 422 graduates. The APC is an 18-day, live-in course comprising practical instruction in geological, geochemical and geophysical prospecting methods, held in the Cowichan Lake area on Vancouver Island. Other topics include law, metallurgy and provincial government acts and regulations. The class is limited to a maximum of 32 students. The course is jointly sponsored by the Ministry of Energy, Mines and Petroleum Resources and the Ministry of Advanced Education, Training and Technology and is administered through Malaspina College, Nanaimo. In-class instruction and accommodations are provided at the Ministry of Forests, Cowichan Lake Research Station. Most of the in-field instruction and exercises are conducted at Mount Sicker, approximately 30 kilometres, east of the station. The curriculum is divided into two parts: part one, ten days long, deals with geology and general prospecting methods while part two, seven days long, reviews geochemistry and geophysics. A day of rest separates the two parts. The 15th annual APC is scheduled for May 7 to May 24, 1991.

The most advanced course, introduced in 1990, Petrology for Prospectors, is a continuing education course for those who have training and experience at or above the Advanced Prospecting Course level. The course is of seven days duration and examines rock and rock-alteration assemblages as they relate to some of the most important mineral deposit types of British Columbia. Laboratory study of rock suites is the basis of the course. It was offered for the first time from March 26 to April 1, 1990 in Smithers, in cooperation with the Smithers Exploration Group. The second edition is intended to be offered in Kamloops in April 1991 in cooperation with the Kamloops Exploration Group and Dr. Tom Richards.